S. HRG. 98-951

SAFE DRINKING WATER ACT AMENDMENTS OF 1984

HEARINGS

BEFORE THE

SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

SECOND SESSION

ON

S. 2649

A BILL TO AMEND THE SAFE DRINKING WATER ACT (TITLE XIV OF THE PUBLIC HEALTH SERVICE ACT) TO AUTHORIZE FUNDS FOR FISCAL YEARS 1984, 1985, 1986, 1987, 1988, AND 1989, AND FOR OTHER PURPOSES

MAY 14; JUNE 11 AND 26, 1984

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SAFE DRINKING WATER ACT AMENDMENTS OF 1984

MONDAY, MAY 14, 1984

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT,
Washington, DC.

The subcommittee met at 10:08 a.m. in room SD-406, Dirksen Senate Office Building, Hon. Dave Durenberger (chairman of the subcommittee) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator **DURENBERGER**. The hearing will come to order. Good morning, and welcome to the first hearing of the Subcommittee on Toxic Substances and Environmental Oversight on amendments to the Safe Drinking Water Act. I introduced S. 2649, the subject of this morning's hearing, last week, and I was pleased that Senator Humphrey, a member of this committee, has joined in cosponsoring the legislation.

We are here today to discuss a topic of great importance to all of us, ensuring that drinking water does not pose a risk to the health of the people of America. The needs for change in current practices and a forceful program directed by the Federal Government is best expressed by a few illustrative figures from recent reports issued by the Environmental Protection Agency and others: 28 percent of the water supplies in a random survey of metropolitan systems were found to be contaminated by one or more toxic organic chemicals; 63 percent of the water supplies in the random survey were found to be contaminated; 700 different synthetic organic chemicals, heavy metals, pesticides, and other pollutants have been found in drinking water supplies; 34 of the 50 States have reported serious cases of underground drinking water contamination. That figure was for 1981. No doubt it has increased over the past 3 years.

Taken collectively, these statistics speak clearly to the need for an effective program that will protect the Nation's water supply from potentially harmful contaminants. Because the Federal Government has not been able to implement the provisions of the Safe Drinking Water Act that are designed to protect public health, many States have begun to move on their own.

Beginning in 1982, my own State of Minnesota began a groundwater monitoring program that included testing for volatile organic compoupnds. Despite the generally high quality of drinking water across the State, some communities have been shocked by the news that their water supplies are contaminated. Wells have been closed in cities like Brighton, Oakdale, Lehillyar, Long Prairie, and Adrianne, as a result of this monitoring program.

The principal problem in our drinking water program is the lack of standards to ensure adequate protection for consumers. EPA has published only a limited list of standards which does not include the toxic organic chemical of greatest concern.

Congress intended drinking water standards to be comprehensive and sufficiently strengthened to drive the installation of treatment technology. Congress pegged cleanup standards under the Solid Waste Disposal Act and under Superfund to drinking water standards which, as yet, do not exist.

If we do nothing else in this Congress, and it sometimes appears we may not, we must end what amounts to a moratorium on standard setting at the Environmental Protection Agency.

We try to accomplish that in this bill, by the adoption of best available technology as the basis for standard setting. Drinking water standards will be set as close to the established health effects goal as best available technology can accomplish. This approach acknowledges the fact that we will never know precisely what the dose response relationships are for the hundreds of chemicals found in drinking water, but we do know the removal efficiencies of best available treatment technology.

The measures of our technological capability should be based on the removal efficiencies achieved by a large system utilizing best available technology. Implicit in this measure is a consideration of cost. In order for a large system to have implemented such a technology as part of their operation, it would necessarily be economically feasible.

I am fully aware of the fact that a number of you here were concerned about the absence of specific cost language in this bill. This represents a technical, rather than a philosophical difficulty—I believe—and I look forward to discussion of the issue of cost today and in the future.

We cannot protect consumers from most types of contaminants unless we know that a problem exists. Monitoring is the means by which we discover contamination and check on the effectiveness of existing treatment. The act currently requires periodic monitoring of the water supply to test levels of contaminants for which there are standards because standards for many potentially harmful organics do not exist. Detection of these contaminants have occurred primarily on an accidental basis.

This legislation requires EPA to develop regulations for monitoring upon regulated contaminants for all public systems. These regulations would include standards for monitoring based on likely size. All systems would have to be monitored at least once within 5 years to ensure that contamination does not exist. The public water supply provisions of the act are aimed at removing contaminants before they reach the point of use. The provisions of the act pertaining to protection of underground sources of drinking water recognize the need to prevent contaminants from entering the groundwater supply in the first place.

After listening to previous hearings we held about the nature and extent of groundwater contamination and the limited costly remedies available after the fact of contamination, I have become a strong supporter of protection for the Nation's underground sources of drinking water.

The vital need for such protection is clear, but the best method of achieving it is not clear. This is an area I intend to pursue in subsequent hearings. I suspect many of you here will share your views with me on this very important subject, so we might work toward developing a constructive Federal initiative that will assist the States and localities in preserving the quality of our groundwater supply.

I am confident the provisions in this bill provide the basis for change necessary to provide essential public health protection. I am also satisfied very constructive and open communications will be established during the process of developing this bill. Many of you who are here today provided valuable input to us throughout this process. Your contributions have strengthened our knowledge and our effort. I look forward to hearing your views today and continuing to work together to meet our mutual goals of ensuring American consumers safe water supplies.

Our first panel this morning is Charles C. Johnson, president, C.C. Johnson & Associates, Silver Spring, MD; Foster S. Burba, president, Louisville, KY Water Co. representing the American Water Works Association; and Michael Zihal, president, Long Island Water Co. representing the National Association of Water Cos.

If the three of you are here, would you come up to the witness table? I will indicate that we have written statements from all of you, I believe, which will be made part of the hearing record, and you may proceed to summarize those statements in whatever way you feel most appropriate. I will also indicate in advance that any additions that you may want to make to those statements while the hearing record is open, you may certainly supplement those statements with additional written comment or in response to questions that you may have propounded to you during the course of this hearing.

We will begin with Mr. Johnson.

STATEMENT OF CHARLES C. JOHNSON, JR., PRESIDENT, C. C. JOHNSON & ASSOCIATES

Mr. **Johnson**. Thank you, Mr. Chairman. Let me express my pleasure being given an opportunity to make this statement. I would like to add for the record that the Chesapeake section of the American Water Works Association joins me in my comments.

In my opinion, the subject that we are discussing is one of the most significant pieces of preventative health legislation that has been enacted during this modern era of relating health to environmental concerns. The basic reason for this opinion is simple. The act is directly concerned with people, their health and their well-being. It says contaminants that are harmful to the health of human beings do not belong in our drinking water supply at a level that might produce harm.

Modifications proposed by the amendments of 1984 clarify and strengthen the overall goals and purposes of the act. The committee is to be congratulated for reasserting and emphasizing the preventative health nature of this act; for putting forth goals and policy that are practically attainable and for providing the flexibility in approach that would preclude any substantive opposition to a successful implementation.

Today there is mounting evidence that our water supplies are being subjected to contamination by substances of unknown significance. It is said that over 700 organic chemical contaminants have been found in the drinking water supply of our public water systems. Many of these contaminants are probably of no consequence, but others pose a potential health risk to consumers. Even when the chemical is known to pose a potential health risk under some conditions of exposure, the significance of their presence in trace quantities in drinking water may not be known.

The question is posed, should we let our ignorance dictate our inactions under these circumstances? I don't think so. Neither does Dr. Abel Wolman who said in a speech last summer, in simplest terms, "Get it out now."

Legislation being considered at this time makes it possible to heed Dr. Wolman's concern and admonition with respect to synthetic organic contaminants in drinking water supplies. It directs the Administrator to propose maximum contaminant level goals and promulgate national drinking water regulations for substances that may have an adverse effect on the health of persons. Should he determine that the contaminant does not represent a threat and that a national regulation is not necessary, he is required to publish this finding also. This requirement forces attention to the problem, forces action within reasonable time periods and allows a decision to be made based on the best scientific information that is available. It puts the Government to work for the preventative health protection of the public.

There was a progressive period in the development of water supplies in this country. It is characterized by the rapid improvement in, and wide acceptance of, water treatment technology, control over the dissemination of water-borne diseases, the passage of national legislation, and promulgation of standards designed for the production of safe drinking water.

During this period, we saw the development of rapid sand filtration, the introduction of chlorination and establishment of bacteriological standards for treating water. Two important observations are noted for this span of approximately 80 years.

One, the principle of attainability was established in the setting of water quality standards; and, two, the availability of water treatment technology has always preceded the development of standards for drinking water. These principles are recognized in the bill. Maximum contaminant levels must be as close as is feasible to the goal.

The bill defines the term feasibility to mean with the use of technology, treatment techniques and other means which the Administrator determines to be the best available. It does not require the unattainable.

There is no reason why the feasibility of treating all the modern-day contaminants cannot be considered in terms of today's knowledge and today's technology. Once the best available technology is applied, you have done all at the moment that can be done to alleviate a situation under practical terms. Perhaps this is the place to comment on the legislating of two water treatment techniques that are introduced in the bill.

One would require public water systems supplied surface raw water sources, to filter their water. The other would require disinfection of all public water systems. No other treatment techniques in use today provides the broad-based protection against transmission of bacterial and viral diseases than these two processes properly utilized in the treatment train.

Ordinarily, I would not like to see specific treatment processes included in enabling legislation. In my opinion, the EPA has the authority now to require these treatment practices. But, in the absence of any regulation to date that recognizes the importance of filtration of surface raw water sources and the necessity for disinfection of all public water systems, perhaps it is up to the Congress to provide the leadership in this instance and direct that such regulations be promulgated. These techniques are readily attainable within the realm of feasibility in accepted water treatment practice.

The proposed regulation provides the Administrator flexibility in administering the provisions of the bill. The important aspect of the flexibility of the bill and the various requirements of this bill is that the protection of the public's health is always paramount. When it is determined that an MCL is not necessary, the Administrator must make and publish the determination to this effect. The Administrator is given the flexibility to promulgate a regulation that requires the use of a treatment technique. Note, however, he is authorized, not required, and need only to act to the extent feasible.

Further, there are provisions for variances and exemptions which provide additional flexibility to communities under certain conditions in requiring the Administrator to propose and promulgate his findings under best available technology, treatment techniques, or other means available for each contaminant. The legislation does not mandate the use of such technology, but removes the excuse that may arise on the part of some communities that it cannot be done. The flexibility provided the Administrator under the enforcement provisions of the bill is a step in the right direction. Effective utilization of the authority that will permit the Administrator to issue compliance penalties in limited situations should enhance implementation of and compliance with regulations promulgated under the law.

In summary, the proposed legislation provides a strong basis for moving ahead with the challenge to protect the public's health from contaminants in public water supplies that may have an adverse effect on the health of persons. It says that we will not wait until all the knowledge is present. We will act now on the best knowledge that we have to produce the best water that we can. Who can ask for more?

Senator DURENBERGER. Thank you, Mr. Johnson. That is very helpful. Mr. Burba.

STATEMENT OF FOSTER S. BURBA, PRESIDENT, LOUISVILLE, KY, WATER CO., REPRESENTING THE AMERICAN WATER WORKS ASSOCIATION

Mr. BURBA. Mr. Chairman, the American Water Works Association welcomes the opportunity to appear before you today to express our views on the safe drinking water amendments of 1984.

I am Foster Burba, president of the Louisville, KY, Water Co. and chairman of the association's water utility council. I am a professional engineer with 30 years experience in water engineering and management. AWWA is a 100-year-old nonprofit scientific and educational society and the largest organization of professional water supply people in the world. Our membership includes 3,000 utilities that provide approximately 70 percent of the Nation's potable water and holds, as a common goal, the provision of the best possible water to consumers at a reasonable cost.

We believe in the substance of the Safe Drinking Water Act and support your involvement in attempting to improve the act.

AWWA supports most provisions of the bill. The changes proposed should improve the quality of this Nation's drinking water. However, we note that one major problem area is not addressed in this legislation, small water supply systems.

There are approximately 40,000 small water supply systems in this country with 500 or fewer customers. In 1982, a GAO study denoted that the majority of violations of existing drinking water quality standards occur in these small systems. Small systems are hampered by lack of adequate technical expertise, unavailable funding, and difficulties in obtaining alternative supplies.

If the 1984 amendments are to address the overall problem of drinking water supply in this country, the issue of small systems must be dealt with. Our written statement contains several suggestions for addressing this problem. AWWA will be glad to work with you further in developing these ideas.

As I stated earlier, AWWA supports most provisions of the 1984 amendments. We endorse the requirement for monitoring. It is a necessary and first step in any effort to deal with contaminants which pose a threat to human health. We are especially pleased to see that the bill includes criminal sanctions for contaminating or attempting to contaminate the public water supply. Such sanctions are a needed tool for dealing with incidents such as the threat of cyanide contamination in several Louisiana water supplies.

AWWA has long supported filtration and disinfection as treatment techniques where necessary to ensure drinking water quality. We support the provisions of the bill related to filtration and disinfection.

We are pleased to see that the provisions for public notification have been modified to provide the Administrator the much needed flexibility to distinguish between health related and administrative violations.

We also support the requirement for public notice of the availability of monitoring results. Many of our members now provide this information as a customer service. Without better health effects information, however, the usefulness of this information is questionable.

AWWA supports the strengthened underground injection control provisions of the amendments. However, we believe that a simple requirement for a one-quarter mile separation between drinking water sources and hazardous waste injection wells does not ensure adequate protection. We believe that agencies must have the authority to require separation distances or other controls on underground injection based on consideration of hydrology and site-specific factors.

The inventory of underground injection wells provided for in the amendments should be a useful management tool, particularly if the current requirement is improved so that source of information beyond historical data to limit the number of sites will be used in conducting the inventory and the resulting information is made available to water suppliers.

As the representative of the suppliers of drinking water in this Nation, AWWA strongly supports any effort to improve drinking water quality. However, we have serious reservations with respect to the imposition of best available technology based on previous experience under the Clean Water Act with that concept. We recommend that the current language of the amendments be revised to require the EPA Administrator to make a determination of best available technology based on demonstrated availability rather than bench scale or laboratory results. By requiring that a treatment technology be demonstrated at operating scale prior to its being imposed as a regulatory requirement, needless cost to the customer can be avoided.

We urge the subcommittee to consider the reality that best available technology must not only be best but also available, available on a scale and at a level of reliability such that it can be employed by the water utility industry on a cost-effective basis.

This then is the most important aspect of the current bill which we would like to see improved. We urge in the strongest terms that the subcommittee revise the current language so that cost and demonstrated availability are considered in defining BAT.

We have one other major concern with the bill, the involvement of the National Academy of Sciences is eliminated and the Science Advisory Board is given merely an opportunity to comment on proposed regulations. We believe every one here today will agree that lack of health effects is one of the most serious problems confronting us. Another step toward divorcing science of the issues of safe drinking water is a mistake. We urge the subcommittee to revise the language of the current bill so that the Science Advisory Board is required to comment on the scientific merits of any proposed drinking water regulation.

We also recommend that the board be involved in a mandatory way in a process of setting priorities for development of MCL's.

In the brief time alotted to me, I have only been able to touch on several of the highlights of our views. I would urge the subcommittee to give careful consideration to the detailed comments contained in our written statement.

Finally, I would urge you, Senator Durenberger, and other members of the subcommittee, to use your good offices on two other aspects of the drinking water problem. The first of these is a major effort to increase funding for needed health effects research. The second is to vigorously pursue better control of contaminants at the source for both point and nonpoint discharges. While far from simple, it is clearly most desirable to limit introduction of contaminants at the source rather than to deal with them in low concentrations at the drinking water end of it.

In closing, AWWA commends the subcommittee's efforts to date on the complex problem of assuring adequate supplies of drinking water. We appreciate the opportunity to appear today, and I will be pleased to answer any questions you may have. Thank you.

Senator **Durenberger**. Thank you for the statement. Your written statement is helpful in its detail. I am sure we will take a close look at all aspects of it.

With regard to the latter two points you have made, I continue to urge you to make common cause with everyone else on both the research issue and on the point/nonpoint issue you raise.

Mr. **Burba**. I am serving notice that we are going to be more vigorous in those areas.

Senator **Durenberger**. Thank you very much. Mr. Zihal.

STATEMENT OF MICHAEL ZIHAL, PRESIDENT, LONG ISLAND WATER CO., REPRESENTING THE NATIONAL ASSOCIATION OF WATER COMPANIES

Mr. **Zihal**. Good morning, Mr. Chairman. I am Michael Zihal, president of the Long Island Water Corp. and am immediate past president of the National Association of Water Companies. Today I am here representing NAWC.

NAWC is a nonprofit association consiting of 286 investor-owned water suppliers who serve 50 million Americans in 32 States.

Please bear in mind, Mr. Chairman, we are suppliers of water. We are not polluters of water, but neither are we manufacturers of water. If we were, we would manufacture only pure water. I assume that's what you are drinking. In fact, we must borrow water from the environment which sometimes has already been contaminated by nature and by man.

To place the costs of man-made pollution where they belong, we support strong enforcement of the Clean Water Act, RCRA, Superfund and other such laws at the Federal and State level. Where natural pollution persists, we accept the necessary job of purifying the water before we serve it to assure there is no unreasonable or even significant risk to health. However, we are constantly aware and reminded by our customers and our public utility commissions that our customers ultimately pay for this cleanup, though neither they nor we are responsible for water contamination.

NAWC supported enactment of the Safe Drinking Water Act and will always support its goals "to assure that water supply systems serving the public meet minimum national standards for protecting the public health." We believe this act has contributed to the provision of quality drinking water to a greater number of people on a more consistent basis than would have been the case without it.

Reauthorization of the act provides the opportunity to improve it. In this regard, NAWC has met with a broad spectrum of people in Congress, environmental groups, trade associations and local, State and Federal agencies with an active interest in the act. We are grateful for this opportunity to share our experience and air our views.

In regard to S. 2649, the goals and policies, NAWC supports the approach of S. 2649, which is to establish goals and policies for the Safe Drinking Water Act in lieu of RMCL's. This will hopefully clarify for State and local authorities the difference between MCL's, which are achievable, and goals, or as is currently in the act, RMCL's, which are perhaps ideal contaminant levels but may not be achievable in fact.

Goals should be based on the application of sound scientific principles. NAWC also supports the orientation of the goals and policies toward preventative actions, such as the provision of adequate controls on activities that threaten to contaminate groundwater resources in order to prevent any such contamination. Such a preventative approach is not only cost-effective, but it is certainly more equitable than allowing pollution incidents to occur and then paying for the cleanup.

Section 3 of the bill makes several significant modifications to the act's primary standard-setting mechanisms. I will address each of these individually.

Although NAWC does not believe that timetables and deadlines are the most prudent approach to regulation, they are also somewhat beside the point. NAWC will support or oppose future regulatory actions on their merits. Specifically, the association will be guided by whether the regulation is founded upon sound science and achievability, not by whether it is promulgated by some arbitrary date.

NAWC wholeheartedly endorses the approach of 2649 that requires goals and MCL's to be proposed simultaneously and subsequently promulgated simultaneously. We think that this will streamline, clarify and ultimately speed up the regulatory process.

We also think that it will eliminate a source of confusion with respect to the relationship between goals, formerly called RMCL's, and MCL's, and especially in the public forum.

NAWC supports the establishment of a system such as that contained in S. 2649 which would create a list which sets priorities for the review of substances to be considered for regulation. We believe this to be a huge step forward in rationalizing the regulatory process. It will separate real problems from minor ones and, thereby, allocate the finite resources of EPA, the States and the supplier industry in a way that maximizes protection of public health.

The bill also requires that listed contaminants either be regulated or else removed from the list on the basis that a national primary drinking water regulation is not necessary because the levels of such contaminant found in public water systems do not represent a threat of a known or anticipated adverse effect on the health of persons. We think that the frequencies as well as levels should be considered so as to take into account seasonal or temporary phenomena, such as turbidity from spring thaw or storm runoff.

Currently, the act requires the Administrator to make a finding that monitoring for an MCL is not economically or technologically feasible. NAWC believes that the current test is sound and should not be changed.

Outbreaks and threats of water-borne disease are serious concerns that are appropriately addressed by requiring EPA regulations on filtration of public water systems supplied by surface raw water sources. Similarly, NAWC does not object to the bill's provision for regulations requiring disinfection for public water systems. Both the filtration and disinfection provisions specifically allow the granting of a variance. If administered in a prudent manner, these provisions and, where appropriate variances therefrom should provide increased protection of public health while at the same time avoiding regulatory overkill.

S. 2649 changes the act's definition of feasible in two ways. First, the definition deletes the act's requirement that feasibility be determined by taking costs into consideration.

Second, the bill removes the act's requirement that technology, treatment techniques or other means, be generally available.

NAWC believes that this tightening of the regulatory or standard-making mechanism of the act is not prudent. NAWC is on record with many others who believe that the current Safe Drinking Water Act has not worked as well as it should. The problems and potential areas of improvement have not, in our view, arisen from any weakness or inadequacy in the standard-setting mechanism.

Congress can certainly act to clarify the meaning of the words "generally available." The definitional problem cannot be avoided simply by adopting a best available technology test. This, too, must be defined. Whether the criterion is "best" or "generally" is a policy choice that should not turn upon the erroneous assumption that "generally" cannot be defined while "best" can be defined.

We believe sound policy favors retention of generally available technology. The use of BAT appears to be borrowed from the Clean Water Act. BAT is made workable in the context of that act through the use of "classes and categories" of dischargers.

We believe the Safe Drinking Water Act should require the same quality of water from all suppliers and, therefore, urge Congress to reject an approach that will force suppliers to obtain variances en masse.

The consideration of costs for promulgating MCL's and treatment techniques should be reinstated. As you know, to consider costs is not the same as weighing them. It is unsound, in our view, to regulate in a manner that could yield standards which will have marginal costs vastly out of proportion with reduction of contaminant levels.

The Administrator should be given authority to draw the line at some point. The deletion of cost consideration lacks conceptual and factual merit. The determination of BAT under the Clean Water Act requires the Administrator to consider costs. Indeed, whatever faults may lie in the current Safe Drinking Water Act, the consideration of costs in determining feasibility of promulgating MCL's and treatment techniques is not one of them.

We are aware of no reference in the record to date to problems which have arisen as a result of this provision of the act.

As previously stated, NAWC represents investor-owned water utilities. Unlike our municipal counterparts, we have an additional layer of regulation by regulatory commissions throughout the United States. These companies, when seeking rate relief, have the burden of proof that the expenditures for both capital costs and operating and maintenance costs are prudent and cost-effective and that the costs incurred are justified by the benefits.

The ability to raise capital in the competitive markets to maintain adequate debt ratings is essential to providing good service at the most reasonable cost to the customer. If the regulated industry has the requirement to consider costs and benefits, the Federal laws which are enacted creating these investment burdens should have the same constraints.

S. 2649 would amend section 1412(e) of the act to provide that the Science Advisory Board have an opportunity to comment prior to proposal of a maximum contaminant level goal and national primary drinking water regulation. NAWC strongly believes that goals and regulations should have a sound scientific basis. This foundation should include competent, independent peer review. SAB seems to be capable in this regard. NAWC is concerned, however, that the bill is not strong enough in its requirement for SAB review. Specifically, we believe that a rule should not be promulgated until SAB has had a chance to submit its determinations on the merits.

Alternatively, as a bare minimum, SAB should be required either to submit its substantive reivew prior to promulgation of a regulation or a brief statement for the rulemaking record saying why it is unable to provide such review.

This latter requirement would put all parties on notice as to why SAB did not act in a timely fashion.

NAWC believes that the administrative order provisions of S. 2649 could be improved in two ways. First, the references to "shall" should be changed to "may" so that the Administrator has flexibility to utilize his enforcement authority. Second, EPA's administrative order authority should be limited to nonprimacy States. The act currently contains adequate authority to assure that primacy States are carrying out their enforcement responsibilities.

Public notification; NAWC, as you know, often has been critical of the act's public notification requirements. This is one provision clearly in need of reform. We have carefully reviewed it. We do hope that the Administrator's regulations are promulgated promptly and that they carry out the intent and spirit of what we believe the bill is trying to accomplish. That is, public notification should be tailored to the circumstances creating a need for it.

Variances; we read the bill's variance provision to require the Administrator to define BAT for purposes of granting a variance at the time he promulgates an MCL for a contaminant.

We are somewhat concerned with two aspects of such a provision. First, this determination threatens to lock in technology that existed at the time the regulation was promulgated. While the act requires periodic review of revised primary drinking water regulations this provision is often ignored.

Second, it is unclear what effect, if any, this provision will have on primacy States which are granted the authority to issue variances.

Exemptions; we have no major concerns with the exemption provision of S. 2649 other than to express the concern that the last paragraph not become the major method by which small systems get relief from what will undoubtedly be added regulatory burdens.

Underground injection of hazardous waste; effectively, we made the same comments as AWWA. However, we would like to add one additional thought, and that is, the proponents of underground injection should bear a fair burden to show their activities will not damage or destroy a drinking water source.

Tampering with public water systems; we do not intend to document individual incidents of tampering in a public forum. Suffice it to say that incidents which have occurred are serious enough and widespread enough to warrant Federal action in this area.

NAWC supports section 11 of the bill. It is absolutely essential as small systems receive some form of assistance that will help them to comply with what undoubtedly will be an increased regulatory burden because of the implementation of the act. The authorization of appropriations does strike us as rather inadequate.

Monitoring; NAWC supports the monitoring section.

In conclusion, Mr. Chairman, I will be happy to respond to any of your questions. NAWC would also like to reserve the opportunity to submit specific legislative proposals to address the issues in this statement.

Senator DURENBERGER. That has been the case for the last 9 months and will continue to be the case. We hope when we get this legislation to the floor, it is going to be a workable piece of legislation and that has been our thrust all along. I thank you and compliment you on your statement.

Mr. Johnson, I mentioned in my opening statement I was interested in exploring the issue of best available technology standard setting with the witnesses today. We have heard from all of you about this issue and consideration of cost and defining best available technology is, I think, implicit in the bill. But in order to be a demonstrated best technology for a large system, I said in my opening statement it must have been subjected to be economically feasible, and it seems reasonable and desirable to set standards on that and the principle that they should be compatible with whatever are our best proven removal capability.

I just wonder how, in your estimation, should cost consideration be used in selecting BAT for standard setting?

Mr. JOHNSON. First of all, Mr. Chairman, I would like to make just one comment. Some people are afraid they are going to be locked in when you go the best available technology. I would comment that we have been locked in since 1925. There has been very little effort on the part of industry to bring in new technology. We have made a great deal of progress in modifying, perfecting, and making more effective existing technology. So I don't want anything that has to do with economics to prevent us from moving into new technological areas.

Senator DURENBERGER. I would say the record so far before this committee agrees with that statement. If anybody here doesn't agree with it, we would like to see some evidence.

Mr. JOHNSON. I believe this is the only way to go. It may cost, but without that, we are never going to get through the first dozen MCL's. I would hate very much to see us go to the Scientific Advisory Board with every MCL. I believe that the time is now for us to use best available technology while we continue to do the research to see how well we have done, not wait for the research to tell us what we have to do.

Best available technology in today's parlance could be today what is in effect in Europe. They are using technology there that we are not using. I understand there are some 30 water plants and they are using GAC. In this country, we talk down the possibility that that might become a regulation in this country, and 2 or 3 years ago, it was introduced and the entire industry got up in arms, rightly so up to a point, but it wasn't that we were going to try to make it work, we merely were going to oppose it because it didn't work in the way that we wanted to see it work.

We have got to do things that are just a little bit on the cutting edge of technology in this country, as we see it, and so we have to look to other places as to what is best available technology.

Senator DURENBERGER. Do either of the others want to comment on that?

Mr. BURBA. This is a very difficult question, but we have to view technology and view workability, you have to recognize that many of the systems are publicly owned. It will require bond issues based upon 20 to 30 years payout. Those systems simply cannot be changing technology every 2 or 3 years. That is a practical thing I would like to point out.

The technology must be based upon the total cost, performance, not only the capital cost, but the operation and maintenance cost and the doability on a plant scale. Taking something out of a laboratory and putting it in and requiring it to plant scale should be proven first by demonstration on a plant-scale level.

Again, I think all of this has to be tied in somehow to perceive reduction of risk. This is why we must realize we can never provide a risk-free water. I am not sure that triple distilled water would be risk free to everyone.

I think you have to tie technology to workability, No. 1; and No. 2, some type of performance that it is doing something for you.

Senator DURENBERGER. Does Mr. Zihal have any comment?

Mr. ZIHAL. You indicated economically and economically to me indicates there is a cost consideration. There is at least one case on record where the community itself was told to do something for treatment and was known to be bad and the community turned it down.

I would be interested to know what you suggest they do about it.

Senator DURENBERGER. That part of the bill addresses what they do about it. I don't think we are talking about community by community when we talk about a particular best available technology to be economically feasible.

If, in a comparable situation somewhere else that particular technology is economically feasible or generally appears to be economically feasible, then it doesn't seem appropriate that we deal with a specific objection or whatever in a specific community.

Mr. **Johnson**. Mr. Chairman, I want to make sure you understand, I am not offbase with my colleague here, Foster Burba. I believe it should be demonstrated also, but I also believe it has been demonstrated and is being demonstrated in this country, both on a small scale and most recently in the city of Cincinnati where they are building a large-scale modern treatment plant to deal with synthetic organic contaminants in the water supply.

Senator **Durenberger**. This is precisely what I was trying to say in response to Mr. Zihal.

Mr. **Burba**. Mr. Chairman, this is a very important subject to us and to everyone in the United States. I realize the goal you people have, but we have a particular stewardship. To me, health is paramount in the water supply. Sensing that, our neighbor upstream from Louisville, upstream 100 miles or so, it has gone to the GAC route. We have experimented with river bank filtration and modification of disinfection. We think this latter case, the river bank filtration, holds some real good possibilities. So I would hate to see a best available technology required; that it would exclude other technologies that might be more appropriate for a particular utility or water supplier that might be more cost-effective.

Senator **Durenberger**. I doubt if anybody on this panel would disagree with that.

Mr. **Johnson**. As a matter of fact, I am sure that would be one of the best available technologies that would be recognized, used extensively in Europe.

Mr. **Zihal**. That all depends on the Administrator.

Mr. **Johnson**. I don't think so. He doesn't work in a vacuum. Certainly the industry was very successful in guiding the direction of the Administrator in times past. I think they would be likewise to do so in time future.

Senator **Durenberger**. Mr. Burba, you indicated in your statement your support for required filtration and disinfection. Could you tell us approximately what proportion of your members do not currently use these methods?

Mr. **Burba**. Sir, I do not have that information offhand. Perhaps some of my colleagues do. I will be glad to get that information. [See p. 50.]

Senator **Durenberger**. Why don't you supply that to us.

Do you believe water suppliers in general view the contaminants that can be controlled by these technologies as still more of a threat to public health than synthetic organic chemicals that are found in the water supply?

Mr. **Burba**. Let me be sure—would you repeat the question sir?

Senator **Durenberger**. Do you believe that water suppliers in general view the contaminants that can be controlled by the filtration-disinfections kind of technologies as more of a threat to public health than synthetic organic chemicals?

Mr. **Burba**. I think perhaps they do, and I think I do, for this reason: We have a lot to find out. We are talking about the known situations of public health in one aspect and cancer, say, on the other. The thing that comes to my mind, I don't want to open a can of worms, but we have done in Louisville, and other utilities, too, considerable monitoring since 1976. We are spending about $725,000 per year on monitoring and water quality control, our particular utility. It is important that we do it.

We are finding, No. 1, the Ohio River is getting cleaner and we are appreciative of that. No. 2, when we do find something in the water, SOC, it is very low level and not always present in every sampling. But the thing that occurs to me and this is why we need research, is that in our treatment processes, we are generating most of the SOC's found in the water, and this is true of anyone. We simply do not have the health effects research that is needed to give us the guidance on basic things like disinfection.

Congress wrote into the Safe Drinking Water Act $408,000, as I recall, for research on chloroform health effects. This work is being done by Stanford Research Institute. We are still awaiting those results. We think they are very important. We need more research, sir, in basic treatment, basic health effects and particularly the disinfection process because I am convinced that most of the SOC's found in public water supplies come from that particular treatment. We need to address that issue if we are really concerned about SOC's overall and public health versus man-made chemicals.

I have taken a long way around, but I think it is an important point.

Senator DURENBERGER. Can you supply for the record some indication of how many of your members monitor unregulated contaminants? Will that be difficult to determine?

Mr. BURBA. We will be glad to do that. We provided Congressman Eckart some information earlier, and we will be glad to provide that information. [See p. 50.]

Senator DURENBERGER. Is that the kind of information that EPA might make use of, not the numbers, but the data that is developed in their standard-setting process or for designating priority chemicals?

Mr. BURBA. We think EPA should use all available good data and that would be available. Certainly we would like to work with EPA. We have the same goals. It is a matter of how we arrive at them. We certainly would be glad to work on that. We have been promoting, and I am sure C.C. will remember my participating in a national panel discussion about 1978.

At that time, I indicated that we needed monitoring on a national level, and I am convinced of that more and more. That was at a time, sir, when many of the so-called authorities were saying our groundwaters were pristine. And it takes monitoring to find out what the situation actually is and it takes more than just sporadic monitoring, it takes a comprehensive ongoing program.

Senator DURENBERGER. Let me get to two or three small practical matters several of you touched on in your testimony. You suggested an accelerated schedule for monitoring of unregulated contaminants so EPA could use the information.

Do you believe there is adequate lab capacity to handle testing of samples for 69,000 or so water utilities in less than 5 years?

Mr. BURBA. No, sir, this is a real problem because the monitoring we are talking about, and let's think in terms of just the organic compounds, takes a lot of exotic equipment. I am not sure the equipment could be manufactured in that short period of time, No. 1.

No. 2, it takes the personnel, especially training, in those sectors. You have to have a startup period, you have to have the monitoring. Somehow I would fault everyone, Congress, EPA, everyone, for not having a national monitoring program.

Senator DURENBERGER. You indicated $125 each for technical assistance, which is our $5 million authorization, you didn't say a drop in the bucket, but you said it is too small. Have you any idea what an ideal amount for technical assistance ought to be?

Mr. BURBA. I believe Mr. Markwood of the State of Illinois could better address that. It would have to be considerable depending upon the monitoring required.

We think the States would be a good vehicle for the monitoring of perhaps State conducted, State approved, or State contracted laboratories. I would guess, sir, we are talking 10 to 20 times the $5 million that is mentioned.

Senator DURENBERGER. Does that lapse over into the other part of your testimony in which you said we ought to have a specific provision for providing monitoring money for those 40,000 small systems as well?

Mr. BURBA. Yes. A complete analysis of the 129 priority pollutants would cost up to $2,500 for one analysis of one supplier. It might be as little as $1,500, but I would think more in terms of $2,500.

So when you get into that, $5 million won't go very far.

Senator DURENBERGER. Mr. Johnson.

Mr. JOHNSON. Mr. Chairman, I would like to comment a little bit on the laboratories. You heard the same story when you went into the Superfund Program—there just aren't enough laboratories. American industry has a terrific resiliency for mining where the gold is. Make the requirement, I dare say, the laboratories will be there.

One other thing, we have heard for a number of years that it costs $2,000, $2,500 for complete run of priority pollutants. By contract, the EPA, through its contract lab, is now getting as little as $550.

Senator DURENBERGER. Mr. Zihal, let me give you an opportunity to get a little farther into the cost and the BAT issue. I assume granular activated carbon aeration would currently be defined as best available technology for removal of volatile organics. Do any of your members currently use these technologies in their treatment process?

Mr. ZIHAL. As a matter of fact, on Long Island, one of our members is currently putting in treatment on some wells. I am a well supplier. So I am dealing in a different direction than Foster is. I am not talking about NAWC. I am talking about my personal location on Long Island. We have contamination, as you know, in our groundwater sources. We are designated a sole-source acquifer, and we have VOC's and all the other exotics that from time to time will appear in that type of groundwater source. We have treatment on some wells on Long Island. GAC doesn't lend itself as well to our operation as does air stripping.

Yes, GAC is accepted today, and was accepted even way back when. The only thing was that in certain instances, it was going to be applied just arbitrarily, just as in this case where air stripping was found to be the better way.

Senator **Durenberger**. If we can take the arbitrariness out of the process, would you still object to using best available technology?

Mr. **Zihal**. I have no problem with best available technology or with generally available technology, but I do have a problem when you indicate economics is included in the definition. To me, economics means costs have to be considered. I don't want to overstress costs. I don't want to say costs are the primary and the only reason for checking or for going into a treatment process; I am saying cost must be considered. That is our way of life. That is the way we operate in this country. We don't just do something because it is an exotic thing to do. We weigh and balance all factors including costs.

This is what I am saying, costs should be balanced in that determination process; that is all I am saying. I don't care how you define general or best or anything, that is for the lawyers to decide somewhere else.

Senator **Durenberger**. You also stated your general disapproval for timetables and deadlines for EPA standard setting under the act.

Mr. **Zihal**. You go by past experience, Senator.

Senator **Durenberger**. None of us like it because it is unrealistic and yet we understand any bureaucracy—it is not only true of government, it is true of industry as well—unless you tell somebody it has to be done by Friday at 3 o'clock, it just doesn't get done.

Mr. **Zihal**. You know your people better than I do. We make that comment because we don't think it would fly.

Senator **Durenberger**. Wouldn't it, though, be welcome to get some certainty into this whole program that it will be done by Friday at 3 p.m. if it can be done? Isn't it the absence of that kind of certainty and some comprehensive standards that has been a problem in the past?

Mr. **Zihal**. I have no problem with that at all. As a matter of fact, your comment is very well taken. We would just as soon get on with it, get it over with and let's go out and train to do what we are trained to do. We are not trained to come to hearings and do these other things; we are trained to deal with the public water suppliers.

Senator **Durenberger**. I thank you all very much. If there are any additional written comments any of you would want to make, it will be a help to us for the record.

Our second panel is Donald Boyd, Director, Water and Pollution Control Department, city of Kansas City, MO, representing the American Metropolitan Water Agencies; Jacqueline Warren, Senior Attorney, Natural Resources Defense Council; Edward Hopkins, Research Director, Clean Water Action Project; and Ira Markwood, Manager, Division of Water Supplies, Illinois Environmental Protection Agency, representing the Conference of State Sanitary Engineers. We will go in the order you were introduced, Mr. Boyd will be first. Your full statements, which I have before me, will be made part of the record and we will appreciate your summarizing them.

STATEMENT OF DONALD BOYD, DIRECTOR, WATER AND POLLUTION CONTROL DEPARTMENT, CITY OF KANSAS CITY, MO, REPRESENTING THE ASSOCIATION OF METROPOLITAN WATER AGENCIES

Mr. Boyd. Mr. Chairman, I do plan to summarize my statement. I am Donald R. Boyd. I am director of the Water and Pollution Control Department for the city of Kansas City, MO, and I am president of the Association of Metropolitan Water Agencies, and I appreciate the opportunity to be here on behalf of the member agencies.

The association was formed to serve as a voice for the publicly-owned operations throughout the Nation's larger metropolitan areas. Member agencies of our group provide water to about 40 million people in 43 States.

We do support the Safe Drinking Water Act and some sort of a reasonable implementation. The large agencies throughout the country have been in the business of protecting the public's water supply, and we intend to continue that and do whatever is necessary to provide safe water.

As you know, we have been operating for about a decade under the Safe Drinking Water Act. Our comments today are on specific areas of the act and particularly on the bill that has been introduced, S. 2649, as well as a few comments about national drinking water standards in general.

The association that I represent strongly supports national drinking water standards. We are concerned about the lact of standards and wish to commend this committee for efforts in trying to develop a process to someway or another expedite this process. AMWA also appreciates the subcommittee's efforts to eliminate some of the confusions surrounding the development of standards and goals. The Senate bill, as introduced, changes the names of RMCLs to maximum contaminant level goals and further differentiates between goals and standards by requiring the development of standards and the publishing of goals.

We think this is an important issue, and we thank you for trying to deal with the matter.

STANDARD-SETTING PROCESS

We believe the Senate bill is very similar to our recommended approach to standard setting. AMWA has recommended a three-tiered approach based on frequency, occurrence and health effects. Our main concern is to get national standards set. This should be done in close cooperation, we believe, with the States and the cities, along with the Environmental Protection Agency, to ensure that realistic and workable standards are someway or another accomplished.

COST AND TECHNOLOGY CONSIDERATIONS

AMWA strongly supports MCL's based on generally available technology with cost as a consideration as provided under the existing law. The Senate bill will require the development of MCL's based on best available technology without cost as a consideration.

This provision would be devastating to public water suppliers for several reasons. First, this would result in MCL's at or near zero since it is possible to remove all contaminants from drinking water when cost is not a consideration. Some of the processes that come to mind are reverse osmosis and distillation, and that sort of thing.

We would, in essence, be creating a standard that no one could meet. Every AMWA member would have to line up for a variance that may needlessly alarm the public.

Second, this approach would result in construction and technology that may not be necessary. AMWA has always supported local self-sufficiency through their rate structure and unnecessary Federal requirements for capital expenditures and specialized treatments may make it impossible to reach that goal of self-sufficiency.

With municipal water supply distribution systems in poor conditions and maintenance costs continuing to rise, publicly-owned water supply agencies should not be expected to forego badly needed maintenance for treatment that may not be necessary.

TREATMENT REQUIREMENTS

The Senate bill would require filtration as a treatment technology for all public water supplies supplied by well water sources, unless the system can obtain a variance. The bill also requires disinfection as a treatment technology.

AMWA supports the disinfection provision of the Senate bill and commends the subcommittee for taking action in this area. We also have no objection with the filtration provision, but the requirement presumes that the water supply is unsafe. We urge the subcommittee to keep this requirement, but we believe that a water system should be presumed safe unless there is evidence to the contrary. The burden of proof should rest with the Environmental Protection Agency.

A few comments about public notification requirements. AMWA has been very critical of the public notification requirements of the Safe Drinking Water Act. We believe the current requirements in the act should be changed to distinguish between violations which are minor, infrequent or procedural and those which are serious or persistent.

AMWA has recommended that the EPA Administrator, or the State, if it has primacy, be given flexibility to determine when notification is needed. We have recommended a two-tiered approach to public notification with the first tier providing for immediate notification of presence of some sort of a contaminant with respect to which adverse health effects have been demonstrated.

The second tier would provide for more general notification, perhaps annually, of all contaminants found in the drinking water supply. We wish to commend the subcommittee for including provisions in the Senate bill which goes a long way in carrying out some of the recommendations we have made. Thank you.

Senator DURENBERGER. Thank you very much. Ms. Warren.

STATEMENT OF JACQUELINE M. WARREN, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL

Ms. WARREN. Thank you, Mr. Chairman. I want to start by saying I have been working for organizations for the past 10 years who have been seeking the kind of legislation that this bill represents, and we certainly welcome it.

NRDC strongly supports many of the provisions in S. 2649, especially those that would establish a national goal for drinking water quality, since such a goal exists in many of our statutes. I believe the absence of it has been somewhat responsible for the slow pace of implementation.

S. 2649 would also establish the date certain by which EPA would have to deal with many contaminants already found in our drinking water. Such action has been so long overdue that only a specific congressional directive can alter the longstanding bureaucratic inertia we have seen.

We also support the required monitoring by water suppliers because we really have lived for very long with the assumption our water is safe to drink. In fact, the data that accumulate everyday show that that assumption doesn't have a strong basis. At least when the monitoring is completed, we will know what the facts are rather than having only unsubstantiated assumptions.

We also strongly support enhanced enforcement, the streamlined exemption authorities, and the direction to the Administrator to publish best available technology for the MCL's that are promulgated. The concept of best available technology it is in the Clean Water Act and Clean Air Act and certainly ought to be in the Safe Drinking Water Act.

In addition, we support the prohibition of Class IV underground injection. We also are concerned about the fact that Class I wells are the major recipients of the majority of liquid hazardous waste which EPA recent figures indicate are some 8.6 billion gallons of waste every year. Those wastes are all going into Class I wells. The last draft of the bill that I have seen doesn't deal with the Class I well problem. We strongly urge and recommend language for an inventory of Class I wells that ought to be carried out to see whether, as some others here expressed, the practice of deep well injection is not likely to endanger ground water. Certainly the burden should be on those who are engaged in this practice to show the practice is not endangering ground water rather than vice versa.

With specific reference to some of the provisions in the bill, for example, the declaration of goals and policy, I would support the first two statements. However, we are a little bit puzzled about policy statement 2(b) which asserts a policy of recognizing and preserving the responsibilities and rights of the States in providing safe drinking water.

The 1974 act enacted a structure that defines the relative responsibilities of the States and the Federal Government and we are concerned and would like to know if that policy simply restates that policy or represents somewhat of a retreat from the strong Federal interest that was expressed in the 1974 legislation.

Certainly, the history of drinking water in this country shows a need for a strong Federal presence, and we urge the subcommittee to make sure the language in this subsection is not interpreted as representing such a retreat.

With respect to the standard setting basis, again, we have another concern because the policy goals and existing rules say the standard-setting goal is preventing an adverse effect on health. We agree that the Administrator should have to state in the Federal Register why a standard is not being set for contaminants that are listed on the mandatory list and also on the priority list. But we are concerned about the language which has been chosen as a basis for the Administrator to show why a standard is not necessary. The language is that the levels occurring don't represent any known or anticipated health effect. In fact, we are concerned that such a test could be used by opponents of a proposed standard to require EPA to show that the levels occurring do represent a threat. It seems to me that would completely turn the burden around on EPA.

We just heard a witness say that EPA should bear that burden. We agree that the agency should have to establish a basis for a standard that it is going to be requiring, but if the policy goals are going to be achieved, that standard should be that the contaminant may have an adverse effect on heath. Once you place the agency in the position showing that something already poses a threat, you are reacting, you are not preventing.

We would suggest the language be changed to say that the Administrator must publish a statement that a standard is not necessary because there is no evidence that the contaminant may have any adverse effect on health, or language to that effect. We have suggested some in our testimony.

Another point is the question of promulgating treatment technique requirements when those are available, as an option for the Administrator. This is a problem that has been troubling us for many years. Under existing law, the promulgation of a treatment technique requirement is a second order option. The Administrator must use an MCL unless it is not possible to monitor or economically or technologically not feasible. The change in S. 2649 still preserves that hierarchy of response and says treatment techniques may be prescribed only where there is an overriding or technical constraint on monitoring. We believe the problems of contamination of drinking water are such that the decision to require treatment of the water should be left to the Administrator. We also see potentially extended litigation over what is an overriding constraint on monitoring in a given situation.

We also think the Administrator should have the flexibility to make the determination of what is the most appropriate response in each instance. Certainly, public comment on any proposal will allow anyone who is thinking differently to have ample opportunity to disagree with the Administrator. But for Congress to say EPA cannot prescribe a treatment technique unless a contaminant cannot be monitored, it seems to me you are putting an artificial barrier in the way of effectively dealing with the problem.

On the issue of monitoring for unregulated contaminants, we strongly support enactment of section 13 to accomplish the objectives of that section. We have been a bit concerned over what we thought was an ambiguity in the language. It states that in establishing monitoring requirements, the Administrator may consider system size and contaminants likely to be found in the drinking water. Your opening statement clarifies that this is for setting a schedule, not for adding or subtracting contaminants to be monitored. Nevertheless, the language also does say the States have the flexibility to add or delete contaminants based upon an approved assessment of what contaminants might be present. I hope the legislative history will clarify what the limitations are and what a primacy State can do in requiring individual supplies to monitor to make sure the overall objective that all systems have to do the monitoring at some point in 5 years can still be achieved.

The question of underground injection is one that has been in the news very much, especially with the recent release of EPA's survey of hazardous waste. As I said, we included some language in our testimony that could be adopted for the committee to consider requiring an inventory of those hazardous waste injection wells.

We also would like the committee to consider expanding the monitoring requirements for drinking water sources that are downgradient of Class I wells so that any drinking water source which is penetrated by a Class I well is also monitored. I think the delineation of a certain radius for monitoring is somewhat arbitrary. To make sure we have a good handle on whether there is migration out of the well, I think any source penetrated by a Class I well should also be subjected to additional monitoring requirements.

We also support strong notification the requirements. Mr. Hopkins will be presenting testimony on this, and we subscribe to it

An additional point concerns the streamlining of the variances and exemptions provisions. The exemption provisions have been used simply to give an open-ended license for noncompliance to many systems which, for whatever reason, have not been able to comply. The GAO documented a poor record of enforcement by EPA in the States on compliance with the standards, and on variances and exemptions. We strongly support three of the four criteria for granting and extending exemptions that are in this bill. They are measurable, objective criteria.

One of them, that the system is taking practical steps to comply, causes us some concern because the word "practical" is really not defined in the statute and has not been interpreted by the courts as far as I know. It threatens to become a catchall that could provide for acceptance of any number of excuses for noncompliance without any kind of statutory standard to circumscribe what is a practical step. We would urge the subcommittee consider deleting that from the bill.

We also in our testimony suggest a number of additions to the bill. One is the addition of a private right of action for persons, public water systems, and anyone else whose water supply has been contaminated by the polluting activities of others.

At the present time, they have to rely on the private tort system which has certain inadequacies or on enforcement by State and Federal agencies. With the cutback in the enforcement resources we have seen over the last several years, the enforcement of Federal programs that would curb permit violations under the Clean Water Act, or that would require the hazardous waste requirements of RCRA to be met is simply not what everyone would like them to be.

Two other points and then I will be through. One has to do with the sole-source aquifer provision. We would like to see that provision cover aquifers that provide a substantial portion of the supply of trucking water in an area. We also would like to see the provision expanded to cover more activities then just those that are federally assisted. It should cover fully-funded Federal activities as well as activities that threaten ground water. Then, the Corps of Engineers, Bureau of Reclamation or other Federal agencies would have to take into account potentially adverse effects of their activities on underground drinking water sources.

Finally, there is one area of potentially major contamination of ground water that has not been addressed under any law today. That is nonhazardous surface impoundments. There is a provision in RCRA, subtitle (d), for the regulation of nonhazardous waste disposal sites. It is not very well funded. It isn't being implemented very well. EPA has already documented the presence of thousands of surface impoundments containing wastes which are not technically harzardous under RCRA, but nevertheless pose a serious threat to ground water. We would like to see the committee include in this bill or another bill to deal with ground water separately provisions to establish a program for nonhazardous surface impoundments. These would include operating and design requirements similar to those we have for hazardous waste land disposal. Unlike leaking underground storage tanks and other areas of hazardous waste threats to ground water that have been discovered recently and are now being addressed, this is one that isn't being addressed. Thank you.

Senator DURENBERGER. Thank you very much. Mr. Hopkins.

STATEMENT OF EDWARD HOPKINS, RESEARCH DIRECTOR, CLEAN WATER ACTION PROJECT

Mr. HOPKINS. Thank you, Mr. Chairman. I will be brief and highlight some of the major points in my statement because I do agree very much with the points Ms. Warren has made.

I am here representing the Clean Water Action Project which has worked for more than a decade now with citizens and consumer organizations around the country to stop water pollution and safeguard drinking water supplies. I appreciate the opportunity to speak here today concerning what we regard as one of the Nation's most important but unfortunately one of its most neglected public health laws, the Safe Drinking Water Act.

Nearly a decade has gone by since Congress first passed this law and it is in need of significant improvement to provide adequate protection to the public. The intention of Congress—to protect consumers from waterborne disease—has clearly not been achieved, and in a number of important respects, particularly in regard to standard setting, enforcement, and monitoring, the Environmental Protection Agency has failed to implement the statute.

The evidence is increasing through surveys EPA has done, and through anecdotal evidence, such as well closings, that we do have a problem with drinking water. Scientific evidence that drinking water contaminated with some chemicals can cause disease is gradually building, taken from Woburn, MA, and Hardeman County, TN, where citizens were exposed to hazardous substances in ground water over a lengthy period of time. These studies show that there are adverse effects from being exposed to even low levels of contaminants in drinking water.

We are very broadly supportive of your bill because we believe that it reestablishes the original principle of the Safe Drinking Water Act that we should act preventatively to protect the public from potentially dangerous substances without necessarily insisting upon complete information. It is likely to take decades to find the exact cause and effect relationships between exposure to substances in drinking water and disease.

We note that your bill deals principally with regulation of water suppliers and does not deal so much with protecting water supplies from being contaminated in the first place. Just to emphasize, we would like to see comprehensive legislation to protect ground water resources. EPA's strategy promulgated earlier this year is not likely to do much to safeguard this resource, so we look to Congress for action. We realize you are not going to have an opportunity this year to enact ground water legislation. It is going to take some time to develop this, but we at least hope you will be able to initiate legislation this year to provide a focus for discussion so we can get off the ground in the next session of Congress.

To comment more specifically on some of the aspects of 2649, we note it would expedite the issuance of additional drinking water standards, improve the enforcement mechanisms available to EPA, establish safeguards for underground injection of hazardous waste, and require monitoring for currently unregulated substances.

We generally support all those provisions. In the section dealing with goals, I must reiterate Ms. Warren's comments about the role of the Federal Government in assuring safe drinking water and ground water protection. Congress has enacted a number of statutes over the past decade that do give the Federal Government a very strong role in protecting the public from substances in drinking water and hazardous waste.

We believe, and we hope you will find when you introduce your legislation on ground water, that there is a Federal role in protecting this resource as well as regulating the quality of water that people ought to be provided. We hope that this goal can be changed to reflect the Federal interest in this subject so that we don't preclude a strong Federal role for managing interstate acquifers and preventing the establishment of ground water pollution havens.

In the area of drinking water standards, we are very pleased to see some deadlines to prompt EPA to get on with the job of issuing standards for very commonly found organic contaminants. We have no problem with renaming the recommended maximum contaminant levels as maximum contaminant level goals but if this is merely a change on wording, as we understand it to be, we hope that that will be emphasized in the report language so the courts don't perceive some change in the intent of Congress here.

We also have the concern that the flexibility given to the Administrator to not regulate certain substances that are listed in the bill is inconsistent with the basic goal for regulation which is to allow the Administrator to regulate substances which may have any adverse effect. We hope the language would be changed so we don't put the burden of proof on the Administrator to demonstrate certain levels of contaminants in ground water do represent an adverse effect level on persons, but to leave the Administrator with the flexibility to regulate substances which may have any adverse effect upon the health of persons.

One of the most important provisions in your bill is to force water utilities to use the best technology that is available. This is a well-established approach under other major environmental laws and incorporating it into this statute offers important protections for consumers. For too long, the ability of the Administrator to require large water systems to use more sophisticated treatment technologies that their consumers could easily afford has been hindered by the inability of small system consumers to install these same technologies. This provision makes it clear that large public water systems that serve 90 percent of the population can be required to use technologies that small systems would not be able to afford and, at the same time, the concept of requiring the best available technology would ensure that the consumers who are served by small systems will receive the best drinking water that system is capable of providing.

I believe that the technology-based approach is unreasonably constrained in your bill by requiring the Administrator to make a finding of "overriding economic and technological constrains on monitoring." I would prefer to see the Administrator authorized, whenever he believes that the technology-based approach would better serve the interest of public health, to specify the use of treatment techniques. If that flexibility is unacceptable, we would at least urge the committee to delete the word "overriding" which sets up what could be a large hurdle to ever requiring the use of treatment techniques.

The provision of the Safe Drinking Water Act concerning public notification, has a very sound intent, but unfortunately, it has not worked over the past decade. Part of the reason has been that water utilities have been reluctant to comply with the law, and EPA and the States have been reluctant to enforce it.

We understand that flexibility in administering the public notification provision may be warranted, but we hope the committee would add additional safeguards into the language of the bill to maintain the original intent of the act: To ensure that consumers are informed of the quality of their drinking water in order to help develop a willingness to pay for the improvements in the treatment system that may be necessary.

To that end, we hope the bill would be amended to ensure that water utilities use the mass media, not only water bills, to notify the public of contaminants in drinking water. This is important because not everyone receives a water bill. There are many people who never see a water bill, people who rent, for example. Notice of acute violations should be given immediately. "Serious violations" should be defined either in the bill or report language to include violation of any MCL's, treatment technique requirements and monitoring and reporting regulations.

We would also like to see the public notification include notification of the detection of unregulated substances which occur in drinking water—especially so if the Administrator has developed health advisories on those contaminants—so that consumers will develop an understanding that their drinking water is not free of contaminants.

One last point concerns monitoring for unregulated contaminants, an initiative we strongly support and have been urging for the last several years. Your provision, however, I think could be improved in a couple of ways. First of all, it appears that from the language that what you are doing is looking for a snapshot survey of what is in peoples' drinking water. Unfortunately, though, the water quality changes from time to time and I would prefer to see monitoring which is done periodically, once every 2 to 3 years. Certainly larger water systems, those serving 10,000 or more people, should be monitoring the water regularly.

You heard Mr. Johnson say earlier, that the cost of monitoring has been decreasing rapidly over recent years. I don't believe the cost of testing for a number of unregulated contaminants this would present an unacceptable burden to consumers.

I also think there should be provision for followup testing supplies where contaminants are detected.

Finally, I hope that the report language in the bill will make it clear that States should not be taking the liberty to delete contaminants from the list of substances to be monitored without very strong evidence that those contaminants are unlikely to be found in the drinking water.

As you know from the testing program that has been going on in your own State of Minnesota, contaminants are turning up in places where people did not expect them. I hope that we can proceed with a monitoring program on an empirical basis and not hypothetical basis to find out what substances are in the public's drinking waters.

Thank you very much, that concludes any statement.

Senator DURENBERGER. Thank you very much. Mr. Markwood, you are our designated cleanup hitter.

STATEMENT OF IRA MARKWOOD, MANAGER, DIVISION OF WATER SUPPLIES, ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Mr. MARKWOOD. Thank you, Mr. Chairman. I appreciate this opportunity to testify on behalf of the Illinois Environmental Protection Agency, State of Illinois and the Conference of State Sanitary Engineers. I would like to summarize the written statement which I have provided to you.

The provision of safe drinking water is a multifaceted operation and no part can be ignored in preference to another. We cannot afford to reduce or discontinue our efforts to protect against the traditional water-borne diseases in order to put into effect new protective measures. Any improvement in protection must be in addition to and not in place of what is now being done. Consequently, when adding to the program, we must look at the effect on the existing protective measures, and I mention this because the resources are limited, and we cannot afford to see that protection against immediate hazards disregarded in order to take care of possible future hazards.

Subsection (a) of section 3 confers on existing regulations a permanence many do not deserve. For example, there are questions about the microbiological and radionuclides standards, among others. Upgrading of their status will, in effect, give them more credibility than they deserve and will probably delay, if not cancel, this process.

It would be better to require acceleration of the review so that the standards would be better substantiated.

Passage of section (b) in its present form will be disastrous to the water supply program. The setting of maximum contaminant levels implicitly requires monitoring. Cost of analyses proposed by paragraphs 1 (a) and (b) are staggering.

At present, there are approximately 3,600 public water supply wells in Illinois. Assuming the analysis can be spread over 5 years, the annual drain will be $400,000. In Illinois, this program is underfunded.

Further reduction in the existing program caused by the proposed amendments would make it impossible to meet the requirements of the Federal statute and regulations and would necessitate reconsideration of the acceptance of primacy. The burden of cost would then fall on the suppliers themselves. For a high percentage, the analysis expense would be greater than the complete annual budget for operation of the supply.

Furthermore, there are not now sufficient facilities and trained personnel to provide the analyses. The capital cost for the equipment and housing, if these amendments pass, for the State of Minnesota alone, has been estimated at $6 million. This would require a new building and all the equipment needed to conduct the analyses.

Another aspect of the problem is the collection of samples. The standard samples as now taken if collected incorrectly, will show a higher level of contamination than actually exists. Trihalomethanes are required to be analyzed only for supplies serving 10,000 people; or more for these the supplies we can have trained sample takers. For the substances listed in this bill, we need the same type of trained sample takers which would be impossible for the small suppliers and would have to be funded by the State.

The question of cost has been gone into in such detail, not becuase it is thought to be more important than the public health implications, but for the exact opposite reason. The resources to be used if this bill includes these provisions will have to be taken away from existing already inadequate programs. Therefore, we recommend that MCL's be promulgated only for those substances for which adequate knowledge on the effect on human health is known. That does not mean we have to have positive proof, we just need a reasonably strong case.

Furthermore, the MCL's should be set only for those substances which appear in drinking water so that monitoring for other substances which are known not to be there will not be necessary.

The change to section 1414 (a)(1) and (b) which requires the Administrator to act 30 days after notification should be deleted because it will be counterproductive. We have—we meaning the regulators—have had an excellent relationship with those we regulate in the water supply industry. We could not conduct our programs without their cooperation. On the smaller suppliers, where we do not deal with professionals, we do have problems. We concentrate on those because, for example, in Illinois, the city of Chicago, among others, is run by professionals and needs very little of our attention. Limiting the amount of time available to reach compliance with those supplies which are run by professionals will set up an adversary position which will result in the deterioration of our relationship and result in hiding of problems rather than seeking assistance.

Water suppliers now come to us for assistance. If they are afraid they will face an enforcement action, that will be discontinued. There must be discretion available to determine when formal enforcement will occur.

Section 5 contains changes to the public notification requirements. We strongly support this section.

The first change in section 6 requiring the installation of equipment in all cases where variances have been granted is not supported by logic. It does not allow the use of scientific or engineering knowledge which may determine that the cost of the equipment and installation and operation will be wasted.

We agree with the addition of section 1426 as stated, but geologic and hydrologic conditions must be taken into account and may require more than one-quarter mile separation between an injection well and a drinking water well. We recommend that the parenthetical statement should be changed to read at least within one-quarter mile of the injection well bore, or more, depending on the local hydrologic and geologic conditions.

The contents of sections 10 and 11 of the proposed amendments will assist in assuring the provision of safe drinking water, except that more money should be available for technical assistance.

While section 12 increases and extends appropriations for the drinking water program, the amounts generally fall short of the needs. This is particularly true of the sums authorized for research and for State programs.

The addition by section 13 of a new part (a)(2) has a flaw. There is no standard or guidance given for placing substances on the list to be monitored. Here, as as in section 3 of the proposed amendments the sample collection and analysis costs may be exhorbitant and beyond the resources of the entity responsible for the expense.

The fact that systems serving under 150 service connections will be reimbursed will not alleviate this problem. Supplies serving from 150 to about 1,000 service connections may have great problems in obtaining adequate funds for monitoring for these substances.

These comments are meant to be constructive and aid in improving the quality of drinking water supplies to this country. They represent general agreement of the water supply program managers of the States.

Thank you for the opportunity to present this statement, and I will be pleased to answer any questions.

Senator DURENBERGER. Thank you very much. Mr. Boyd, you indicated that setting mandatory limits—you refer to the MCL—do much more to protect public health in setting unattainable goals for which no scientific basis exists. EPA has not yet set any RMCL's, but the purpose of RMCL is to reflect the scientific information we have about health effects and risk of exposure.

Why does your association believe that no scientific basis will exist for RMCL and don't RMCL's serve any useful purpose, in your estimation? Should we be going to a standard based on technology alone?

Mr. BOYD. I think our main concern is that there be two different numbers there. If there are two different numbers, one for RMCL and one for MCL, the public will automatically take up with the lower figure of the RMCL. In effect, that now looks like it ought to be zero.

Senator DURENBERGER. Mr. Markwood, is Illinois currently monitoring for unregulated contaminants, as you seem to indicate in your testimony? I just wanted to make sure you are aware States which already have such programs would not have to duplicate that monitoring.

Mr. MARKWOOD. We have a program, but it does not encompass all the suppliers in a short period of time. We are trying to cover as much of the groundwater supplies as possible based on the resources available to us.

Senator DURENBERGER. And judging from your statement, you have a serious financial resource problem in Illinois.

Mr. MARKWOOD. That is correct.

Senator DURENBERGER. Mr. Burba indicated you might be able to tell us what kind of resources small systems generally need for technical assistance beyond what was recommended in our bill. Do you have an opinion you could share with us now?

Mr. MARKWOOD. The majority of problems are found in the small systems. I would hesitate to put a dollar amount on it because it could vary so much, but it is in the small system where we find operators with little or no training and managing entities which could be local government boards with no understanding whatsoever.

Some of them really do require a great amount of technological assistance. I think the amount needed here, well, just as an estimate, probably is 10 times this amount for the whole country. It would do more than 10 times the good.

Senator DURENBERGER. You have in your statement a lot of Illinois detail on costs to a variety of things—I don't know if you were here earlier, but Mr. Johnson said something I thought was somewhat self-evident, maybe only from up here or to him, and that is that when you—this is in particular with regard to your comments on Minnesota is going to need $6 million worth of laboratories, his statement was somehow or another out there in the private and quasi-public sector when there is gold to be mined, somebody finds a way to do it at a lot less cost. Do you disagree with that statement?

Mr. MARKWOOD. No; in fact, we figured our cost of analysis on the basis of about $500 each. The problem is that it can't all be done in a hurry. I think I can best compare that to the complete

Interstate Highway System being done in 3 to 5 years—it just can't be done.

Senator Durenberger. But you will stand with all the data in here. For example, you have got some teriffic figures here for the MCL monitoring program, the complete estimate for your State, $1,804,600 or an annual drain of $400,000. I am just wondering, do you have available to you or maybe you could make a part of the record how much the people of Illinois currently spend on wine, beer, and other alcoholic spirits each year and how that compares to what they spend on ensuring the safety of their drinking water. That might be helpful to the record.

Mr. Markwood. I am sure it will be an interesting comparison.

Senator Durenberger. I would like to see the figure. Maybe I will get Minnesota to do that, too.

Mr. Hopkins, one of your comments related to the bill's requirement on monitoring in the time period, just by way of clarification, it wasn't our intention to limit monitoring to once every 5 years, despite the fact you might interpret that from the cost figures we were given for large systems. That was a minimum figure for the small system.

We expect, I think, at least my assumption, that EPA will require monitoring more frequently in large systems and somewhat less frequently but probably more often than every 5 years in the medium size systems. We are trying to put some time parameter in there and then suggest the Administrator use some judgment within that timeframe to do it most appropriately for the size of the system.

I would like to deal, Ms. Warren, and perhaps Mr. Hopkins, a little bit with the waste injection situation. I think each of the witnesses this morning have made some reference to it. Some people have said we have been a little bit too restrictive on our above and below definitions, and so forth. But it is said by many to be the method of disposal for about 55 percent of the Nation's annual load of hazardous waste. Yet, it is a means of disposal. I bet most folks out there in America haven't heard anything about it and for that reason, probably have little particular concern about the resulting contamination.

I wonder if you believe that this is because underground injection is for some reason a safer or preferable method of disposal compared to surface disposal or ocean incineration, or have you made any assessment of the relative risks of the various types of disposal in terms of their potential it can't contaminate ground water?

Ms. Warren. We have tried to gather information on underground injection as much as possible. One of the conclusions that emerged from it, first of all, is that it is not a new technology. It has been practiced for 30 years or more. The people who know the most about it are people who do it and are understandably somewhat reluctant to tell someone like me the kind of answers I was trying to find out.

Up to 4 or 5 years ago, everyone was assuming ground water was pristine because the ground was a filter and somehow acted to filter out the contaminants and protect the water. We know this is not true today. This practice of injecting contaminants underneath aquifers involves encasing the wells in concrete and there is a specific technology involved in it. But we are concerned and we do not favor the practice being continued since there is a staggering quantity of waste being injected through this methodology, and the answers to questions about the imports on ground water are really not available. It seems to me it is imprudent at best to make the assumption that the practice isn't going to contaminate ground water, rather than to enact requirements to get information about where the wells are located in relationship to drinking water sources and what kind of geologic formations are present there. We would also like to see Congress impose some additional requirements for monitoring to find out whether there is migration coming out of the wells. We also ask you just to disregard the historical fact that injection of hazardous waste is in this law whereas all other methods of underground disposal are covered by RCRA. It is historical accident that the Safe Drinking Water Act was enacted first and does not impose the same types of requirements as would RCRA on underground injection, such as post-closure liability and financial responsibilities. All the precautions we demand of other types of hazardous disposal are not demanded of underground injection because it is in this law and not RCRA—but they should be.

Apart from that, I think the burden should be on the people who practice underground injection to show it isn't contaminating ground water, using objective methods that involve scientific monitoring. I don't think that is too much to ask them, considering that deep well injection is the main source of disposal of liquid hazardous wastes.

We didn't have good figures on what amount of liquid waste was being disposed by this method before now. We are certainly seeing that the amount is far more than EPA first estimated based on the Agency's preliminary figures. Recent figures show 10 times as much waste is being disposed this way as is being landfilled and 17 times more than is being incinerated.

So I would say the relative risks of this methodology really are not known.

Senator DURENBERGER. Mr. Hopkins, do you have anything to add?

Mr. HOPKINS. I agree with what Ms. Warren has to say.

Senator DURENBERGER. One of the other comments you made, Ms. Warren, dealt with Class I wells. I think your testimony indicated this bill doesn't really address the Class I wells except in the monitoring provision. It seemed implicit in that statement the presumption that the no migration standard in EPA's regulations isn't very effective. Is that, in effect, your position?

Ms. WARREN. That is our position. I think EPA's underground injection regulations are a masterpiece of obscure language. Some people read them to say there is a no-migration standard if you point to one sentence. I can point to another sentence which I quoted in my testimony which says steps must be taken when migration violates EPS's drinking water standards. That seems to suggest that some migration is permissible. We would like to see a real no-migration standard put in place so if underground injection is going to be practiced, there can be no migration for contaminants from the wells. There also have to be ways of monitoring to make sure that is the case.

Senator DURENBERGER. I believe you heard Mr. Boyd's testimony with regard to public notification requirements suggesting a two-tiered approach for all types of violations. Would you, Mr. Hopkins, have a reaction to that?

Mr. HOPKINS. I think perhaps there is need for additional flexibility in public notification procedures, and I don't have any particular objection to what the bill suggests. I have talked at length with the EPA people about what they would do under this language, and I am pretty well satisfied that the program they outlined to me would meet the objectives of the act.

I am concerned, however, that mass media methods of notification not be dropped from the language in the law. I am not concerned about the potential for duplicative notification, people receiving notice both through the water bills and mass media. I don't think it will be a problem. If anything, I think people want more information about what is in their drinking water rather than less. That is why we support giving the public information about the detection of unregulated contaminants on their drinking water as well.

Senator DURENBERGER. Let me clarify my question by reading the last part of Mr. Boyd's testimony.

> The association has recommended EPA Administrator or State primacy be given flexibility to determine when notification was needed. We recommended a two-tiered approach to notification requirement but the first tier providing for immediate notification of the presence of contaminants; the second tier would provide for more general notification, perhaps annually, of all contaminants found in the drinking water supply.

That is what I had reference to.

Mr. HOPKINS. I guess I would disagree with that because I think notification should be required quarterly when there are any violations of maximum contaminant levels or monitoring and reporting requirements, not simply annually.

I think if the idea is to encourage a greater willingness to pay on the part of the public—and I think people are willing to pay more—they need to know what the problems are. I think annual notification would simply not be sufficient to inform people about the quality of their drinking water and what improvements may be needed down at the water treatment plant.

Mr. MARKWOOD. Senator, could I comment on that?

Senator DURENBERGER. Certainly.

Mr. MARKWOOD. The present requirement for public notice has a few flaws. No. 1, where a supply is supposed to turn in, let's say, 60 microbilogical samples in a given month and they turn in 59, public notice is required. For practical purposes, that is meaningless.

Second is that where notification is through the media, it also may be meaningless. As I said before, most of the problems are in small systems. Some of them have no local media and if, for example, a small supplier in southern Illinois gets its notification through a publication at Collinsville, they may not even get the paper and, if they do, everybody who is served by that paper finds out something which really is of no importance to them.

Senator DURENBERGER. Ms. Warren, you were going to reply.

Ms. WARREN. Yes; I think if you strike from the language of the present law the references to the communications media, leaving the Administrator only the flexibility to prescribe format of notice. That is a strong indication Congress doesn't want the EPA ever to require the media to be used for notification. It seems to me if that is your intention, that is one thing; I would oppose it. If it isn't, it should be clear in the report language that in an appropriate situation, the EPA can require that the news media be used.

Again, going back to the point that Congress is presumed to do something for a specific reason, issuance of an EPA regulation that dares to mention media when you specifically struck that from the law, I think, might have some problems.

I also support what Mr. Hopkins just said about creating a willingness to pay on the part of the public. First, I think it is already there. If you look at the price people are paying for home water filters and bottled water, it exceeds $1 billion a year. In the past, when EPA began to deal with the organics problem, which is the one that is going to require a real revolution in the treatment of water in this country in places where that kind of contamination exists, the water suppliers opposed it as not a problem. You heard some of the words here again—exotic, unnecessary technology, exorbitant costs. I think some of these same biases are still present. I think people have to be told what is in the water. If there is EDB there on other pesticides in the water, tell them. I think it makes it a little hot for the people whose job it is to supply water. At the same time it should create the willingness to pay for the appropriate treatment. We shouldn't assume we have eliminated everything once we've dealt with water-borne disease. Certainly the people who drink the water in the end should have to pay for it. Water is a cheap resource. It is analogous to where energy was 10 years ago. It is a problem. I think people have to know about the problem and where there is a problem, they should be willing to pay for it. I think they will be.

Senator DURENBERGER. That is why I wanted to get the data on liquor. Mr. Boyd, do you want to wind this up? I don't want you to represent the whole of the industry on the notification issue, but perhaps you can elaborate a little bit on why you made the specific suggestion relative to the two-tiered notification and what you would hope that would accomplish.

Mr. BOYD. Just getting back to what Ira Markwood said about a number of samples taken requires full-blown notification. It gets into the story of the wolf, if you cry wolf a lot of times, nobody is going to pay attention when there really is a problem and there are those problems that come up.

For example, I operate on the Missouri River. We had a fire upstream in a warehouse in Omaha that was a pesticide warehouse. That was a situation that the fire water washed the pesticide in the river and that is a situation that should require immediate notification, people should know about it if it was in our water supply.

On the other hand, if it was a matter of not taking 249 bacteriological samples instead of 250 and have the same full-blown notification, that just puts it in the realm of ridiculous.

Senator DURENBERGER. Thank you all very much. We appreciate the testimony a great deal from all the witnesses today, and I will count on your help in the future.

The hearing is adjourned.

[Whereupon, at 12:15 p.m., the subcommittee adjourned.]

[Statements supplied for the record and the bill S. 2649 follow:]

STATEMENT
OF THE
AMERICAN WATER WORKS ASSOCIATION
BEFORE THE
SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
ON THE
SAFE DRINKING WATER ACT AMENDMENTS OF 1984

MAY 14, 1984

Mr. Chairman, the American Water Works Association welcomes the opportunity to appear before you today to express our views on the recently-introduced Safe Drinking Water Act Amendments of 1984. We commend you for your initiative in introducing a bill that would both amend and reauthorize the Safe Drinking Water Act and for holding these hearings which provide a valuable forum for airing the issues associated with improving the regulatory aspects of the nation's safe drinking water program. I am Foster Burba, President of the Louisville, Kentucky, Water Company, and Chairman of the Association's Water Utility Council.

AWWA is a 100-year old nonprofit scientific and educational society and the largest organization of professional water supply people in the world. Its over 34,000 members include managers, engineers, operators and other employees of community water systems as well as scientists, academicians, state regulators and others. Our membership includes 3000 water utilities that provide approximately 70% of this nation's potable water and hold, as a common goal, the provision of the best possible water to consumers at reasonable cost. Since it was founded in 1881, the Association has been dedicated to promoting public health, safety and welfare through improvement of the quality and quantity of water delivered to the public.

This Association appeared on several occasions before Congress during development of the current Safe Drinking Water Act, PL 93-523, and amendments to it. We believe in the substance of the Safe Drinking Water Act. Our members have operated public water utilities under the Act and implementing regulations since it was passed in 1974. Because of the extensive collective experience of the AWWA membership, we believe that our comments on the Safe Drinking Water Act Amendments of 1984 and our suggested refinements should be beneficial in achieving timely, real and measurable progress towards ensuring the quality of drinking water for human consumption in this country, a goal we all share.

It goes without saying that water is a vital resource and one that needs protection. However, for both surface and groundwater, it makes most sense to remove contaminants at the point of waste discharge where they exist in high concentrations rather than at the water plant intake where they are frequently diluted to very low concentrations. Controlling contamination at the source is an equitable and efficient way of dealing with our nation's water supply problems.

As a fundamental aspect of assuring safe and plentiful supplies of drinking water, EPA should be encouraged to more vigorously control contaminant sources under existing laws such as the Safe Drinking Water Act, Clean Water Act, Toxic Substances Control Act, Resource Conservation and Recovery Act, Superfund, and others. As EPA exercises its authority to prohibit discharge of contaminants into the nation's source waters, the need to remove contaminants from raw water will diminish. Over 1,000 new chemical compounds are being introduced into our environment each year. Many of these challenge traditional raw water contaminant removal techniques and some require innovative and frequently costly new processes to reduce their concentrations when they appear in very low concentrations. Thus the need for control at the source of contamination will increase significantly in the years ahead.

Another aspect of the problem of providing safe drinking water which I would like to emphasize is the issue of small water supply systems. AWWA strongly believes in the concept of "equal protection." Customers of these smaller systems are entitled to the same assurances of a safe supply of drinking water as are the customers of larger, metropolitan systems. Yet, as a 1982 General Accounting Office study highlighted, the overwhelming majority of violations of existing drinking water standards occur in small systems. AWWA urges the Subcommittee to consider this issue in reauthorization and amendment of the Safe Drinking Water

Act. Later in my testimony I will return to the question of small systems and offer several concrete proposals for addressing this problem.

With this brief introduction I now turn to the specific provisions of the Safe Drinking Water Act Amendments of 1984 and the views of the American Water Works Association. AWWA supports most of the provisions of the Bill.

Monitoring Requirements

AWWA supports the provisions of the Amendments which would require monitoring for unregulated contaminants by all public water systems. We are also encouraged by the provision authorizing the EPA Administrator to reimburse very small systems for monitoring costs. As I am sure the Subcommittee is aware, the cost of analyzing one drinking water sample for the 129 Clean Water Act priority pollutants at an appropriate detection level can be as high as $2500. An approach to dealing with this cost impact on smaller systems might be to fund monitoring capability in each state.

Development of a sound base of monitoring data is the first step in making rational decisions on the order in which EPA should develop MCLs. However, the current language of the Bill only requires monitoring once in the five years after EPA issues regulations. We believe the pace of this program should be accelerated to provide useful information for establishing the list of priorities for MCL development, especially since the first list would be required by January 1, 1988 under the Amendments.

Requirement for Disinfection

AWWA supports the requirement in the Amendments that EPA promulgate regulations requiring disinfection as a treatment technique for all public water supply systems. Coupled with a variance provision to take account of raw water quality on a case-by-case basis, the requirement for disinfection should assure high quality water at every tap.

Requirement for Filtration

Similarly, AWWA supports the requirement for filtration as a treatment technique for public water supply systems supplied by surface water sources, unless a system can demonstrate to the satisfaction of regulatory authorities that the quality of its raw water source does not warrant filtration. We believe this is a positive step in addressing a problem of potentially national dimension.

Public Notification

The proposed revisions to the public notification process to allow consideration of intermittent versus continuous or serious violations are an important improvement over existing law. AWWA has long urged that discretion be given to EPA to tailor public notification requirements to the actual threat to public health posed by a violation.

AWWA also supports the provision for public notification of the availability of the results of drinking water supply monitoring programs. Water suppliers are responsible for providing safe water to the public. When information is gathered regarding the quality of water being supplied, the consumer should know of its availability. Many of our members provide this information now as a customer service.

Anti-tampering Provisions

AWWA strongly favors the anti-tampering provisions of the Amendments. Establishing tampering, or attempting to tamper, with public water systems as a federal felony is long overdue. Federal enforcement authorities need the tools to deal with situations such as the cyanide threats to several Louisiana water supply systems.

Technical Assistance

The 1984 Amendments recognize the need for additional technical assistance, particularly in the case of small public water systems. AWWA strongly supports this provision. However, the $5 million annual authorization equates to only $125 for each of the 40,000 small systems (less than 500 customers) in this country.

One of the fundamental problems in carrying out an adequate federal program to regulate the quality of drinking water supplies is the vast disparity in resources and technical expertise available to small as opposed to larger water suppliers. This is reflected in that the majority of violations of existing standards noted in a 1982 General Accounting Office study occured in small systems. Incentives are required to encourage small systems to combine into larger regional networks or to pool resources to achieve higher levels of technical expertise. State small system programs should be strengthened. For many small water supply systems, awareness of available technology and the ability to shift from a contaminated source of raw water are severely constrained. The Subcommittee could do a major service to small system customers by including in the 1984 Amendments provisions for additional support for technical "circuit riders"; low-interest loans for interconnection or provision of alternative sources of raw water; etc. AWWA would like to work with Subcommittee staff to develop a more compehensive proposal in this area.

Priorities for Setting MCLs

AWWA supports the requirement in the Amendments that the Administrator of EPA establish priorities for review of substances which may have an adverse effect on the health of persons. Use of a priority list for setting MCLs allows consideration of the most significant problems first. AWWA believes, however, that the guidance to EPA concerning establishing priorities should be expanded.

The current language states that priorities shall be based upon the extent to which a contaminant occurs in public water systems throughout the United States and on the known or anticipated adverse effects of such contaminants. The monitoring required by these Amendments will generate valuable information regarding levels of contamination and frequency of occurrence. This information is essential to establishing priorities for setting MCLs. We therefore urge the Subcommittee to require use of this information as additional criteria in establishing the priority list.

Two other aspects of the approach to MCL establishment in the Amendments are also of concern to AWWA. First, we believe that a finding of "no threat of a known or anticipated adverse effect on the health of persons" would be a practical impossibility given the current state of health effects research. AWWA recommends that the criterion be changed to require a finding of "no threat of a known adverse effect on the health of persons" as a prerequisite for deletion of a contaminant from the priority list.

Second, to make issuance of MCL regulations a manageable task, AWWA urges that the procedure for setting priorities for establishing MCLs be consistent throughout the Act for all contaminants.

Underground Injection

The proposed amendments would ban the underground injection of hazardous wastes above or into a formation which contains a drinking water source within one quarter mile of the injection well. While we support this concept, AWWA opposes an approach to the underground injection problem based solely on separation distance. Primacy agencies should be required to establish separation distances or other controls on underground injection based on knowledge of the local geology and other site specific factors.

The 1984 Amendments direct the EPA Administrator to conduct an inventory of hazardous waste injection wells and to provide the results to the Congress. However, AWWA urges that the inventory procedures be made more comprehensive so that ultimately the true scope of the problem can be determined. If the scope of the inventory is expanded so that it is not based solely on existing records and a few site visits, the value of the information generated in dealing with the problem of groundwater contamination would be increased.

AWWA also recommends that a provision be added to the Bill directing EPA to make the inventory results available to states and appropriate local water supply utilities at the time they are provided to Congress.

Best Available Technology

The standard in existing law upon which recommended maximum contaminant levels ("RMCLs") are based is "no known or anticipated adverse effect on the health of persons." The 1984 Amendments would carry this no risk standard over as the basis for "maximum contaminant level goals." Maximum contaminant levels, which are enforceable standards, are then to be set as close to the MCL goal as is "feasible." Under existing law the determination of feasibility takes account of the general availability and cost of treatment technology. The proposed amendments would delete these considerations and direct the Administrator of EPA to make the feasibility determination based on "best available technology." Considerations of cost and technical feasibility would apparently be relevant only in the variance and exemption processes.

Although public drinking water suppliers are in most instances regulated utilities and in theory able to pass such costs on to the consumer, failure to consider cost and plant-scale feasibility in the initial standard-setting process could result in extreme waste of resources. If no other change is made to the proposed amendments, AWWA strongly urges that consideration of cost and demonstrated technological feasibility on an operational scale be introduced into the definition of "best available technology."

Role of the Science Advisory Board

Under existing law, the National Academy of Sciences is given an extensive role in developing proposals for recommended maximum contaminant levels. Given the exceeding complexity of issues related to health effects of contaminants in drinking water supplies, AWWA believes that the role of the scientific community in the standards-setting process should be strengthened, not reduced.

The 1984 Amendments would delete these provisions and provide that the Science Advisory Board established under the Environmental Research Development and Demonstration Act of 1978 be given only an opportunity to comment prior to proposal by EPA of a maximum contaminant level goal and national primary drinking water regulation. We strongly recommend that the involvement of the Science Advisory Board be expanded to *require* Board comment on the scientific merit of any regulation prior to its proposal under the Amendments. The Board should also be required to comment on the priority in which contaminants will be reviewed for establishment of MCLs.

Limitations on EPA's Enforcement Discretion

The Amendments would require EPA to issue an administrative order if after thirty days notice from EPA the primacy state had not commenced appropriate enforcement action. AWWA believes that this provision would damage the federal/state partnership which forms the foundation of the Safe Drinking Water

Act. In primacy states, an approach whereby EPA is denied flexibility and must take enforcement action destroys the credibility of the state agency in dealing with utilities. States are the key to effective administration of the Safe Drinking Water Act and have been delegated responsibility to assure safe water. Therefore the federal/state partnership would be better served by granting EPA discretionary rather than mandatory authority to issue administrative orders.

Exemption Deadline

As AWWA reads the basic exemption provision of the Bill, full compliance with national primary drinking water regulations would be required not later than twelve months after enactment of the 1984 Amendments or issuance of a new regulation. In most cases, we believe this is unworkable given the time required to develop treatment facilities. AWWA recommends that the initial exemption period be set at four years.

Health Effects Research

A fundamental problem shared by Congress, EPA, state agencies and water utility companies is lack of adequate health effects research. Significantly increased funding for health effects research on drinking water contaminants should be a Congressional priority. Federally funded research should also be directed at plant-scale demonstration of treatment technologies. The water utility industry should be involved in the planning of research activities and assured of receiving the results in timely fashion. AWWA has already begun efforts through its Water Utility Council to open lines of communication between EPA and water utility managers on this last aspect of the problem and will continue and strengthen them.

Qualifications of Entrants

Another aspect of the small system problem is the establishment of small systems that are either technically or financially unqualified to assure the continued proper operation of the system. AWWA urges the Subcommittee to give consideration to establishing requirements for minimum financial and technical capability as a prerequisite to entry into the public water supply business. Minimum qualifications would create a much greater incentive to make arrangements for inclusion in a regional system. This approach would eliminate the later problems primacy agencies encounter when it becomes obvious that a small system can neither afford to install (or develop the technical expertise necessary to properly operate) a treatment technology required to provide safe drinking water.

Summary

Drinking water is a vital resource, one that is essential to health. It is important that we know what is in the water we drink and the health effects of the constituents found.

The American Water Works Association strongly believes that the Safe Drinking Water Act should be amended. We commend the Subcommittee for their efforts to date in this direction. We support those provisions of the 1984 Amendments which would:

1. Require EPA to establish priorities for setting MCLs.
2. Require monitoring for unregulated contaminants.
3. Establish stringent federal anti-tampering provisions.
4. Provide expanded provisions for technical assistance.
5. Require filtration as a treatment technique.
6. Require disinfection as a treatment technique.
7. Impose additional restrictions on underground injection of hazardous wastes.
8. Provide more flexibility in the public notification process.

While AWWA supports the overall goals of the Safe Drinking Water Amendments of 1984, we urge this Subcommittee to take the following actions to improve the Bill:

1. Clearly require that cost and demonstrated availability be considered in defining best available technology.
2. Expand rather than limit the role of the Science Advisory Board in the priority and standards-setting processes.
3. Include provisions to deal with the technical and financial problems of small water supply utilities.

Finally, we urge that the Subcommittee use its good offices to encourage increased funding for needed health effects research and to press for control of contaminants at the source under existing environmental laws.

You will note my description of the Association's members as "professional water supply people." We share your concern for public health as evidenced by our overall support for the Safe Drinking Water Act Amendments of 1984, our assistance in the development of the Interim Primary Drinking Water Regulations, our encouragement to states to assume primacy and our program of nationwide workshops to develop public awareness of the total effort. We sincerely believe that the changes that we have today recommended will improve the Safe Drinking Water Act and will result in the availability of better, safer water for the public.

We appreciate the opportunity to appear today and I will be pleased to answer any questions.

LOUISVILLE WATER COMPANY
435 SOUTH THIRD STREET · LOUISVILLE, KENTUCKY 40202
502-582-2431

FOSTER S. BURBA
PRESIDENT

June 26, 1984

The Honorable David Durenberger
United States Senate
Washington, DC 20510

Dear Senator Durenberger:

During the hearing held May 14, 1984 on proposed amendments to the Safe Drinking Water Act, you asked that I provide additional information on filtering, disinfection and monitoring practices for the record. This information follows:

In 1981, AWWA surveyed its utility membership to gather information about industry conditions in 1980. Analysis of 1397 responses, representing a served population of 104 million people, found that 733 utilities used groundwater as their raw water source; 135 purchased water from others; and 529 relied on either surface water, a combination of surface and groundwater, or surface supplies augmented with purchased water.

Of the 529 utilities using surface water or a combination of surface and other sources, only 17% (28,755,000 people) did not filter.

The survey results also indicated that approximately 15% (2,709,000 people) of the (1397) responding community water suppliers do not disinfect their finished water.

More recently, the American Water Works Association surveyed predominantly larger community water suppliers to determine to what extent its membership monitored for unregulated contaminants in water supplies.

Based on 359 responses to a questionnaire mailed to 490 utilities, 95% (341 utilities) monitor for one or more unregulated contaminants.

I trust that the aforementioned responds to your inquiry. Should you desire more detailed information, please do not hesitate to contact either me (phone 502/582-2431) or Jim Groff in AWWA's Washington office (phone 202/628-8303).

Sincerely,

Foster S. Burba
President

FSB:jcm

cc: Mr. D. B. Preston, Executive Director, AWWA
Mr. G. Craft, Resources Engineer, AWWA
Mr. F. H. Elwell, Chairman, Water Utility Council, AWWA
Mr. J. B. Groff, Deputy Executive Director, AWWA Government Affairs Office

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STATEMENT BY MICHAEL ZIHAL, PRESIDENT
NATIONAL ASSOCIATION OF WATER COMPANIES
BEFORE THE
SUBCOMMITTEE ON HEALTH AND THE ENVIRONMENT
ON H.R. 3200

Good afternoon, Mr. Chairman and members of the Subcommittee. My name is Mike Zihal. I am President of the Long Island Water Company and President of the National Association of Water Companies ("NAWC"). Today I am here in my capacity as President of NAWC.

I. NAWC and its Member Companies

NAWC is a nonprofit association consisting of 235 investor-owned water suppliers which serve over 50 million Americans in 32 states.

Please bear in mind, Mr. Chairman and Members of the Subcommittee, we are suppliers of water. We are not polluters of water, but neither are we manufacturers of water. If we were, we would manufacture only pure water. In fact, we must borrow water from the environment which sometimes has already been contaminated by nature or by man. To place the costs of man-made pollution where they belong, we support strong enforcement of the Clean Water Act, RCRA, Superfund, and other such laws at the federal and state level. Where these measures fail to stop man-made pollution, or where natural pollution persists, we accept the necessary job of purifying the water before we serve it to assure there is no unreasonable or even significant risk to health. However, we are constantly aware, and reminded by our customers and our state public utility commissions, that our customers ultimately pay for this cleanup though neither they nor we are responsible for water contamination.

II. SDWA and its Reauthorization

NAWC supported enactment of the Safe Drinking Water Act ("the Act" or "SDWA") and will always support its goal "to assure that water supply systems serving the public meet minimum national standards for protecting the public health." We believe this Act has contributed to the provision of quality drinking water to a greater number of people on a more consistent basis then would have been the case without it.

Reauthorization of the Act provides the opportunity to improve it. In this regard, NAWC has met with a broad spectrum of people in Congress, environmental groups, trade associations, and local, state, and federal agencies who have active interests in the Act. Most notable, we had a half dozen lengthy sessions with the Natural Resources Defense Council attempting to develop a consensus approach to reforming the Act to make it work better. To the same end, we met with the staff of the lead sponsor of H.R. 3200, who himself joined in one meeting. We are grateful for the many opportunities to share our experience and air our views.

Regrettably, however, I must report that this dialogue has not been completely successful. In the time available before these hearings, we were not able to forge a consensus, though we feel we made some progress, and now we find H.R. 3200 wanting. We continue to believe that consensus is preferable to confrontation, so we will continue to share ideas on how to improve the Act with anyone willing to join in the effort.

III. Discussion of H.R. 3200

Let me now discuss some major features of H.R. 3200. A more detailed commentary is attached and I would ask at this time that it be included in the record as part of NAWC's presentation.

A. Support for criminal penalties for tampering, civil suits against polluters, and protection for underground water sources

Some features of H.R. 3200 reflect the simple genius that should inspire universal support. Criminal penalties for tampering with public water supplies, for example, promise consumer protection in an area where, in our experience, state laws should but in fact do not have easy application. Another example is the authorization of suits by water companies against the real polluters of water. If potential defendants offer technical changes to this provision, we may wish to comment further, but Mr. Eckart is to be congratulated for helping place the costs of pollution where they belong and creating new incentives to keep the nation's water free of contamination. Title II's effort to promote purity of underground water sources also merits applause. It raises complex issues, of course, which we shall have to appreciate because of our closeness to state and local governments who will be concerned. We may have more to say about title II when those whose ox it may gore have spoken, but the concept of water resource protection is beyond quibble.

B. Comments on Other Provisions

While some features in this bill are good, others are not, and they go to the area of regulatory process where our sincere efforts to develop consensus have focused. We recommend that the

Subcommittee not proceed in this area because we should like to see Mr. Ruckelshaus have an opportunity to develop his own approach and we would like further opportunity to develop consensus and avoid controversy.

1. Required regulation

Sections 101(a)(1) and (2) would *require* regulation of over 100 substances. It hardly seems to be a sound function of a legislature to decide an intensly scientific issue by fiat. How deeply can this Subcommittee address the scientific and technical issues these sections raise?

2. Timetables

H.R. 3200 would also require regulation of these 100-plus substances within three years. We doubt EPA can meet the timetable, for we expect the controversy over proposed regulations to wax strong. To be sure, timetables may be legitimate if administrative lag has perpetuated congressional frustration regarding proven health risks. But unrealistic timetables in controversial and complex matters will beget only problems -- public disrespect for unwise legislation not followed, hasty hence unsound strict regulations, or regulations set too loose by an an agency bent on avoiding confrontation. Far better would be a bill that sets careful and understandable legislative standards to guide EPA to sound decisions based on firm evidence.

3. Occurrence data

H.R. 3200's test of "found or likely to be found in drinking water" for the Clean Water Act's priority toxic pollutants is not responsive to the need for using occurrence data in determining whether federal regulation is warranted. Given the ambitious regulatory agenda of H.R. 3200, the importance of using a meaningful occurrence test in prioritizing regulatory efforts cannot be overstated. Also, occurrence data should be utilized with respect to all contaminants, not just the priority toxics. Within three years of the enactment of H.R. 3200 the number of MCLs would increase by several multiples, from less than 20 to well over 100. It seems to us that many systems will not be able to comply with these MCLs. Therefore, prioritizing regulatory efforts based on occurrence data is not only wise but also necessary.

Instead of the "found or likely to be found" language in section 101(a)(1)(B), NAWC believes the Administrator should have to find that any contaminant is found at levels and frequencies warranting federal regulation via NPDWRs. Where a contaminant presenting significant health risks is found only in one or a few isolated areas, the Administrator should, and does, have other options -- action under his emergency powers, recommendations for action by state or local agencies, or recommendations for congressional action.

4. Scientific basis

Next, H.R. 3200 is too weak in not requiring scientific data as part of the regulatory process. Sound science on the health effects of contaminants is, in our view, an absolute prerequisite to establishing an MCL. To set an MCL in the absence of such data will yield an appropriate regulation only by shear luck. If the MCL is "too low," scarce resources of regulatory agencies, water suppliers, and ultimately their customers are used that could be put to better use elsewhere. If the MCL is "too high," then people are the subject of a cruel hoax in which their water conforms to an MCL, but significant health risks from that contaminant remain. In any event, without a sound scientific basis, the public cannot have confidence in the process or result of regulating. Even a well-intentioned law requiring regulation to the lowest MCL possible cannot assure consumers their water is safe -- only sound science can do that.

5. Treatment techniques

H.R. 3200 retains the Act's treatment technique authority. NAWC believes that H.R. 3200 falls short by not making clear that mere administrative convenience is never sufficient cause for requiring a treatment technique in lieu of an MCL. Treatment techniques should be required only where it is not economically or technologically feasible to monitor for an MCL. NAWC expects that use of treatment technique authority would rarely, if ever, be justified.

6. Supplier operations

NPDWRs should concern themselves with the quality of water received by consumers. Matters such as water intake, siting, operation, and maintenance are the function of water suppliers, sometimes under the guidance of state agencies, and we see no need for Federal involvement in these areas. These provisions should be eliminated from the Act and section 1412(f) of H.R. 3200.

7. Monitoring

H.R. 3200 addresses the issue of monitoring for unregulated contaminants. Many water suppliers in fact already do this and periodically report their findings to customers and state health agencies. Others do not. We do not know the extent of this activity but suspect there is a considerable body of occurrence data already which might be gathered and analyzed. In this regard, we have suggested to the lead sponsor of H.R. 3200 a range of specific inquiries for witnesses at this hearing to help the Subcommittee learn the extent of monitoring going on now.

Beyond this, section 102 goes too far in its open-ended requirement for monitoring and reporting for unregulated contaminants. We believe federally required monitoring should be used for the purpose of determining if priority contaminants with real or legitimately suspected health implications are found in drinking water at levels and frequencies that justify federal regulation.

8. Enforcement

H.R. 3200 makes a dramatic departure from existing law by effectively creating parallel state and federal enforcement authority. This is a substantial impediment to the proper functioning of the Act in primacy states. Federal administrative order authority should be limited to nonprimacy states. Also, an "opportunity to confer," which could mean a phone call, hardly passes the test of fairness and due process in the issuance of administrative orders. The administrative orders proposed here have real consequences (*e.g.*, $25,000 per day penalties), so requirements for notice and opportunity must be observed first.

9. Public notification and information

The section on public notification fails to eliminate the wasteful, untimely, often meaningless and purely technical notification that is required under the Act. Rather than streamline and rationalize the notification process H.R. 3200 merely adds to existing requirements. Proper notification should be tied to health risks caused by violations of the Act. Provision should also be made for notification by persistent violators of even technical requirements. The type of notice required should fit the purpose for which it is needed. Arbitrary approaches of the Act and H.R. 3200 are simply not responsive to the need for an effective notification program.

The provision for public information (section 106(b)) paints too broadly. Its relationship to FOIA should be explored, as should the kinds of information EPA might obtain under section 1445 that would have no use in terms of helping the public evaluate the quality of water supplies.

IV. Conclusion

Mr. Chairman, our other comments on H.R. 3200 are included in the attachment to my statement, and I'd be glad to try to answer any questions the Subcommittee may have.

In conclusion, then, NAWC recommends that SDWA be reauthorized for one or two years in its present form and that provisions on "tampering" and "civil actions" be added. Beyond that we recommend you not go with H.R. 3200. We would like to continue our efforts to build a consensus on the issues of regulatory reform. We also believe the new leadership of EPA should be given its own opportunity to make the existing law work better and develop its own ideas for reform. Let me say that my Association's thinking in this area has broadened, and its appreciation of the views of others has deepened. If we can continue working together, I believe we have a real chance to resolve at least some key issues in ways this Subcommittee will find well worthy of consideration.

Thank you for the opportunity to be here.

STATEMENT OF DONALD R. BOYD
PRESIDENT
ASSOCIATION OF METROPOLITAN WATER AGENCIES
ON
SENATE BILL 2649

Mr. Chairman and members of the subcommittee, I am Donald R. Boyd, President of the Association of Metropolitan Water Agencies. I also serve as Director of the Pollution Control and Water Departments for the City of Kansas City, Missouri. I very much appreciate the opportunity to appear before you today on behalf of our member agencies.

The Association of Metropolitan Water Agencies was formed in June 1981 to serve as a voice for publicly-owned water supply agencies in the Nation's larger metropolitan areas. Member agencies of our Association are responsible for providing high quality, safe drinking water to more than 40 million people in 43 cities.

Mr. Chairman, we support the goals of the Safe Drinking Water Act and its reasonable implementation. The publicly-owned water supply agencies in our Nation's major urban areas have been in the business of protecting the public health for years, and will continue to do what is necessary to provide safe water.

We have been operating for about a decade under the Safe Drinking Water Act. Our comments today are directed toward specific areas of the Act where we believe there are opportunities to improve its effectiveness in addition to providing comments on S. 2649.

NATIONAL DRINKING WATER STANDARDS

AMWA strongly supports speeding up the process of setting national drinking water standards. We have been very concerned about the slow progress in setting standards for some industrial contaminants that are being found across the country in water supplies. We commend this subcommittee for developing a procedure to expedite this process.

We wholeheartedly endorse the goal in the bill, "that all public water systems provide drinking water free of any contamination that may have an adverse effect on the health of persons."

AMWA also appreciates the Subcommittee's efforts to eliminate some of the confusion surrounding the development of standards and goals. The Senate bill, as introduced, changes the name of RMCLs to "maximum contaminant level goals" and further differentiates between goals and standards by requiring the promulgation of standards and the publishing of goals. We are, however, still concerned that requiring water quality goals to be set at a level that assures no anticipated adverse health effects will convey an impression to the public that public water supplies not meeting these goals are unsafe. Setting mandatory limits do much more to protect the public health rather than setting unattainable goals for which no scientific basis exists.

STANDARD SETTING PROCESS

The Senate bill would finalize all interim primary drinking water regulations within 18 months of enactment; give the EPA Administrator 36 months to follow a similar procedure for contaminants listed in the October 5, 1983 ANPRM; and require the EPA Administrator to publish a list by January 1, 1988, and annually thereafter, establishing contaminant priorities. The Administrator then has 3 years from the listing to either promulgate standards or make a determination that such regulation is not necessary. We believe this to be a practical, workable approach to expediting the setting of standards.

COST AND TECHNOLOGY CONSIDERATIONS

AMWA strongly supports the promulgation of MCLs based on generally available technology with cost as a consideration as provided for under existing law. The Senate bill would require the development of MCLs based on best available technology without cost as a consideration. This provision would be devastating to public water suppliers. This standard setting mechanism would result in MCLs at zero for all carcinogens since it is possible to remove all contaminants from drinking water when cost is not a consideration. The bill would in essence be creating a standard that no one can meet. Every AMWA member would need to line up for a variance which would needlessly alarm the public.

TREATMENT REQUIREMENTS

We are not alarmed at the requirement that all water be filtered or disinfected but we do not feel it is appropriate or practical to mandate specific treatment requirements in the legislation. The Safe Drinking Water Act and S. 2649 already give EPA the authority to require treatment techniques if in their judgement they are needed. An in-depth evaluation of scientific data should be made before a specific treatment technique is mandated. Some unfiltered surface water systems provide higher quality water with better disinfection than many filtered supplies.

There are many types of filtration and disinfection techniques; some of them will not accomplish the desired goals of providing safe drinking water. It also appears that it would be extremely difficult to obtain a variance from these requirements under S. 2649.

MONITORING REQUIREMENTS

We support the Senate bill's monitoring provisions and believe that the provisions of this section provide the Environmental Protection Agency with adequate flexibility to develop monitoring requirements which meet the needs of individual water suppliers. We particularly wish to commend the Subcommittee for recognizing the importance of the State role in developing monitoring requirements.

AMWA supports the goal of providing adequate monitoring to assure a safe water supply. We certainly believe in the importance of monitoring for unregulated contaminants and have in the past recommended that EPA be directed to establish a program to monitor various public water systems. We do feel there is a need for EPA to have administrative flexibility to establish monitoring requirements because monitoring needs change frequently and are different for various areas and various sources of water.

PUBLIC NOTIFICATION

We wish to commend the Subcommittee for including public notification provisions in the Senate bill which go a long way in carrying out our recommendations.

AMWA has been very critical of the current public notification requirements of the Safe Drinking Water Act. We believe the current public notification requirements in the Act should be changed to distinguish between violations which are minor, infrequent, or procedural, and those which are serious or persistent. The current notification requirements of minor infractions of the regulations is expensive and self-defeating, and should be eliminated.

AMWA has recommended that the EPA Administrator or the State, if it has primacy, be given flexibility to determine when notification is needed. We have recommended a two-tiered approach to notification requirements with the first tier providing for immediate notification of the presence of contaminants with respect to which adverse health effects have been demonstrated. The second tier would provide for more general notification, perhaps annually, of all contaminants found in the drinking water supply, the failure of the system to conduct required monitoring, and the existence of variances and exemptions.

This completes my presentation. I would be pleased to answer any questions you may have at this time.

Testimony of

Jacqueline M. Warren

Natural Resources Defense Council

The Natural Resources Defense Council (NRDC) is a national non-profit environmental organization supported by 40,000 members and contributors dedicated to protecting public health and preserving the quality of the natural environment. Since its inception in 1970, NRDC's staff scientists and attorneys concerned with toxic substances control have sought, through legislative, administrative and judicial proceedings, to achieve a reduction in involuntary human exposures to carcinogenic and other toxic environmental contaminants. With respect to water quality, these efforts have focused upon obtaining controls on pollution at the source, under the Clean Water Act and the Resource Conservation and Recovery Act (RCRA), and at the tap, under the Safe Drinking Water Act (SDWA). We appreciate this opportunity to present our views on the current state of implementation of the SDWA.

Congress passed the SDWA at the end of 1974, in response to a widesread national controversy over the extensive presence of organic chemicals, many of which are carcinogenic, in drinking water supplies throughout the United States. Since then, the evidence that our water supplies are contaminated by dangerous organic and inorganic chemicals has continued to mount. Organic chemicals such as trichloroethylene, tetrachloroethylene, vinyl chloride, carbon tetrachloride, aldicarb, EDB, chloroform, and benzene have been frequently detected in drinking water.

Although the National Academy of Sciences has identified as carcinogens 22 of the chemicals found in drinking water, and many others are known to be mutagenic or otherwise toxic, the vast majority of the estimated 700 chemicals so far detected in drinking water have not yet been tested to determine their toxicity. Moreover, we now know that a significant portion of our groundwater supplies, upon which half the U.S. population depends for drinking water, are contaminated with industrial chemicals and pesticides. According to a 1982 report by the Office of Technology Assessment (OTA), 29% of the groundwater drinking water supplies of 954 United States cities with populations over 10,000 are contaminated.[1] Similarly, in a Federal Register notice published last year, EPA announced that organic chemicals have been detected in 45% of the public water systems that draw on groundwater and serve over 10,000 people.[2]

The known sources of contaminants in groundwater include disposal of hazardous wastes in landfills and industrial surface impoundments (pits, settling ponds and lagoons); septic tanks and cesspools and the chemicals used to clean them; municipal wastewater; mining activity; petroleum exploration and development; underground injection of wastes, and agricultural, street and urban runoff. Because groundwater lacks the self-cleansing properties provided to surface water by dilution, circulation, and degradation by sunlight and aquatic organisms, groundwater can remain contaminated for centuries. Furthermore, concentrations of contaminants in groundwater can be orders of magnitude greater than levels found in surface water. For example, in 1981 the Council on Environmental Quality (CEQ) reported[1] that the highest level of the widely-used industrial solvent trichloroethylene measured by then in surface water was 160 ppb. By contrast, the highest level so far found in groundwater is 35,000 ppb.[2]

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[1] Technologies and Management Strategies for Hazardous Waste Control, Office of Technology Assessment, March 1983, p.5.

[2] 47 Fed. Reg. 9351 (March 4, 1982).

In light of the potential human hazards posed by exposure to a broad array of dangerous chemicals in drinking water, Congress adopted a preventive approach in the SDWA which requires that uncertainties be resolved on the side of protecting public health. As a matter of policy, the Act favors protecting public health rather than placing the public at continuing risk. The alternative, waiting until the link between disease and consumption of chemically-contaminated drinking water is conclusively proved, is contrary to accepted preventive health philosophy and could impose an unnecessary and unconscionable social cost in terms of future human pain and suffering.[3]

The Environmental Protection Agency's record in implementing the SDWA, and especially the Agency's continuing failure to establish national primary drinking water regulations for organic chemicals, is deserving of strong criticism. Since 1975, EPA has issued only a very short list of maximum contaminant levels (MCLs). The list includes a few pesticides and herbicides, a small number of inorganic chemicals, a standard for coliform bacteria, turbidity, radionuclides, and, since 1979, trihalomethanes.[1]

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[1] Contamination of Groundwater by Toxic Organic Chemicals, CEQ, 1981.

[2] National Revised Primary Drinking Water Regulations, Volatile Synthetic Organic Chemicals in Drinking Water, Advanced Notice of Proposed Rulemaking, 47 Fed. Reg. 9350 (March 4, 1982).

[3] To date there is strongly suggestive evidence of such a link in the more than twenty epidemiological studies that have demonstrated a statistically significant association between bladder and gastro-intestinal cancer and consumption of chemically-contaminated drinking water.

In March 1982, EPA published an Advance Notice of Proposed Rulemaking (ANPR) discussing the possibility of establishing MCLs for a number of organic chemicals that have been widely detected in groundwater. Since last summer, Agency officials have repeatedly stated their intention to propose Recommended Maximum Contaminant Levels (RMCLs) for nine of the compounds listed in the ANPR. Despite these representations, RMCLs have not been proposed and the current publication date is now estimated to be December, 1984. MCL proposals would presumably follow publication of the RMCLs. However, given EPA's internal and external review processes, and the statutory implementation period of at least 18 months following promulgation, it will be the first quarter of 1987 at the earliest before compliance with those nine MCLs would be required.

The consequences of EPA's failure to establish standards for organic chemical contaminants in drinking water are very serious. First, because the establishment of standards is a necessary prerequisite for triggering monitoring of drinking water quality, water suppliers are not presently required to monitor the water they sell for organic chemical contamination. The only contaminants they must look for are the relatively small number presently included in the Interim Regulations. Thus, unless a supplier voluntarily chooses to do so (as have a number of the nation's larger water companies) or else chemical contamination of a supply is so gross as to cause taste, odor or public health problems, most water utilities across the country do not routinely monitor for unregulated contaminants and, accordingly, do not know the chemical quality of the water they provide.

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[1] See National Interim Primary Drinking Water Regulations, published at 40 C.F.R. §142.

Second, and equally important, other regulatory programs designed to prevent contamination of groundwater are keyed to the National Primary Drinking Water Regulations. Under the Resource Conservation and Recovery Act (RCRA), leachate from hazardous waste landfills is only tested for the presence of chemicals included on the Agency's short list of primary drinking water standards. Since most of the chemical groundwater contaminants believed to have resulted from the burial of hazardous waste are _not_ on the list, reliance on the Primary Drinking Water Regulations to protect groundwater against leaking landfills is misplaced. To illustrate, a landfill leachate containing trichloroethylene and tetrachloroethylene, two of the most widely detected groundwater contaminants, would _not_ necessarily be tested for those compounds because they are not on EPA's current list of drinking water standards. Thus, landfill leachate could successfully meet the requirements of RCRA although it was heavily contaminated with dangerous chemicals.

The Underground Injection Control (UIC) program, established in the SDWA to prevent groundwater contamination by underground injection wells, is also keyed to the Primary Drinking Water Regulations. Under EPA's UIC regulations, migration of fluids from injection wells into underground sources of drinking water is permitted unless "the presence of the contaminant may cause a violation of any primary drinking water regulation or may otherwise adversely affect the health of persons." 40 CFR §122.34(a) (emphasis added). This provision permits the leaching of injected liquid wastes into underground drinking water supplies until monitoring detects contamination levels that either violate one of the short list of MCLs so far promulgated by EPA, or else pose an actual threat to human health. In our view, this approach permits significant contamination of groundwater to occur before corrective action is required, and thus directly contravenes the preventive intent of the SDWA. Unless prohibitions on hazardous waste injection and expanded groundwater monitoring requirements are enacted, the potential for groundwater contamination from underground injection activities will remain.

The Subcommittee should be aware that almost 60 percent of the liquid hazardous waste disposed of every year in the United

States is underground injected.[1] This staggering volume of hazardous waste, estimated to be 8.6 billion gallons, must be viewed as a danger to groundwater unless a convincing case to the contrary can be made.

To remedy the problems discussed above, NRDC advocates passage of legislation in this session that would articulate as a national goal the assurance to the people of the United States of a safe supply of drinking water and the protection of our groundwater resources against contamination. Such legislation should also mandate the establishment of (1) additional drinking water standards to protect public health against contaminated drinking water; (2) expanded monitoring requirements for unregulated contaminants to facilitate accurate assessment of the present chemical quality of our drinking water; (3) restrictions on underground injection of hazardous waste, and other land disposal practices that endanger groundwater, and (4) requirements for development and implementation of groundwater protection plans.

NRDC strongly supports S. 2649 because it would clearly accomplish a number of the drinking water quality goals enumerated above. First, it would establish the national goal that drinking water including groundwater should be free of any contamination that may have any adverse effect on human health; second, it would require the EPA by a date certain to set national standards for many toxic contaminants that are presently being found in our drinking water. Such action by EPA has been so long overdue that only a specific Congressional directive can alter the longstanding bureaucratic inertia.

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[1] Environmental Protection Agency, Hazardous Waste Disposal Survey, EPA 530/SW-84-005 (1984).

Third, all water suppliers would be required by section 13 to monitor the water they sell to consumers in order to ascertain whether unregulated contaminants are present. For too long, we have lived with the assumption that our water is safe to drink although data are lacking to support that assertion. At the same time, evidence has accumulated that both our surface and groundwater supplies have been contaminated by a wide variety of commercial, residential and agricultural activities. S.2649 would require the generation of drinking water quality data by every public supply and thereby substitute facts for unsubstantiated assumptions.

NRDC also supports provisions of the bill that would enhance EPA's ability to enforce compliance with the Act or otherwise improve or increase protection of the quality of drinking water. These provisions include:

- sections 4 and 8, which would authorize the Administrator to issue administrative orders in enforcement cases;
- sections 7 and 8 which would streamline the variance and exemption authorities in current law by requiring compliance schedules to be established at the time a variance or exemption is granted, and by placing reasonable conditions and time limitations on these exceptions to full compliance with the Act;

- section 9, which would prohibit hazardous waste injection directly into or above underground drinking water sources, require groundwater quality to be restored when Class III wells are closed, prohibit injection into aquifers containing between 3,000 and 10,000 total dissolved solids, and require monitoring of underground sources of drinking water down gradient from a Class I injection well; and
- section 10, which would authorize the imposition of severe penalties for tampering with public water systems.

In addition to the foregoing, there are provisions of S.2649 that NRDC would like to see strengthened, as well as a number of other amendments related to groundwater protection and private enforcement of the SDWA that we would urge the Subcommittee to consider. Our specific comments and suggested modifications and additions to S.2649 are discussed below.

1. Declaration of Goals and Policy

As stated above, NRDC supports the articulation of a strong health protection goal for drinking water quality in the United States. We are puzzled, however, at the statement in section 2(b), which asserts a policy of recognizing, preserving, and protecting the rights and responsibilities of the states in providing and protecting drinking water quality.

In 1974 Congress enacted a structure in the SDWA that carefully balanced the respective roles of the federal government and the states in assuring safe drinking water supplies. Does the policy in section 2(b) merely restate the relationship established in the Act, or does it represent a retreat from the assertion of a legitimate federal interest that necessitated passage of the SDWA in 1974? The history of drinking water quality in this country teaches that a strong federal presence is a necessary prerequisite to achievement of the goals set forth in sections 2(a)(1) and (2) of S.2649. We urge the Subcommittee to make sure that the language of this subsection does not represent such a retreat.

2. Prompt Promulgation of National Drinking Water Regulations

a. Standard-setting Requirements

NRDC supports the imposition upon EPA of mandatory requirements to establish maximum contaminant levels or treatment techniques for organic chemicals and other toxic contaminants of drinking water, to be met within prescribed deadlines. Left entirely to its own discretion, the Agency has demonstrated its continuing inability to accomplish the task of identifying and setting health protective standards for contaminants of concern in the nation's drinking water supplies.

Almost ten years have passed since the SDWA became law, but after complying in 1975 with the statutory directive to codify the 1962 Public Health Service drinking water standards as Interim Primary Drinking Water Regulations, EPA has set only two MCLs, for radionuclides (1976) and for the products of chlorination, trihalomethanes (1979), during the next nine years. Instead of a comprehensive set of drinking water regulations which would serve to assure water consumers that their drinking water is safe to drink, EPA's list is notable for the widely-detected contaminants that are not on it.

To its credit, the Agency has prepared a set of more than twenty health advisories known as Suggested No Adverse Reaction Level or "SNARL" documents, which provide information to state health agencies and water purveyors about the potential health effects of various contaminants that have been widely detected in water supplies. The advisories are, however, merely adivsory. They do not trigger routine monitoring or treatment requirements as would Primary Drinking Water Regulations. Thus, the objective of the Act, to provide uniform minimum standards for safe drinking water throughout the United States, has not been achieved.

S.2649 would require EPA to move expeditiously towards that goal over the next three years, as well as to establish a mechanism for priority-setting to guide the development of drinking water standards in the future. NRDC supports these provisions. In our view, the bill defines an ambitious but rational standard-setting agenda that should result at long last in the systematic promulgation of a large number of MCLs and treatment techniques. Moreover, the required standard-setting should not be unduly burdensome to EPA. The 18-month mandate addresses the EPA's own VOC's list, and the 36-month charge addresses the synthetic organic chemicals of concern that were published in the Agency's October 5, 1983 Advance Notice of Proposed Rulemaking.

NRDC also supports the mechanism for priority setting contained in section 3(b)(1)(c). We are concerned, however, about the standard for establishing priorities under this subsection. Both widely-occurring but uncharacterized contaminants, and known toxic substances, should qualify independently for inclusion on the list. The language presently in the bill would require a contaminant to be both toxic and widespread. We believe this dual requirement is too restrictive and could exclude contaminants such as EDB, which is highly toxic although not widely occurring.

We also believe that there is an inconsistency in the latter portion of section 3(b)(1)(c)(i), which establishes the schedule for publication of the annual priority list. Just as the Administrator would be directed to publish MCL goals and national primary regulations for substances "other than a substance referred to in subparagraph (A) or (B) for which a national primary drinking water regulation was promulgated", the priority list should include substances which were not regulated under subparagraphs (A) and (B). Accordingly, the second sentence of section 3(b)(1)(C)(i) should be amended to read:

> "On January 1, 1988 and at annual intervals thereafter, the Administrator shall publish a list establishing priorities for the review of substances (other than substances referred to in subparagraph (A) and (B) for which a national primary drinking water regualtion was promulgated)...."

Another aspect of section 3 about which NRDC has serious concerns is the test the Administrator would have to meet to justify a decision not to establish a standard for a compound on any of the three lists described in section 3. As we read this test, it would destroy the "may have any adverse effect" standard that is both in current law and reaffirmed in the goals section of S.2649. The test is ostensibly designed to make the Agency find that a contaminant does not represent a threat to health in order to justify a decision not to regulate it. NRDC believes that in practice, however, this test will be used by opponents of an Agency decision to regulate to require the EPA to demonstrate that the levels of the contaminant being found in water will have a known or anticipated adverse effect on health. This shift in the burden of persuasion is likely to result in standard-setting only where the Agency can produce evidence that levels of contamination represent a quantifiable threat to health. Thus, the preventive thrust of the legislation would be utterly defeated.

To ensure that the preventive "may have any adverse effect" standard is preserved, NRDC urges the Subcommittee to substitute the following language in sections 3(b)(1)(A)(ii), 3(b)(1)(B)(ii), and 3(b)(1)(C)(ii) as the operative test for decisions not to establish primary drinking water regulations:

> (ii) ...a national primary drinking water regulation is not necessary because there is no evidence that such contaminant may have any adverse effect on the health of persons.

3. Promulgation of Treatment Technique Requirements

Section 3(b)(3)(A) of S.2649 would create a new standard for when the EPA Administrator could promulgate a treatment technique requirement is lieu of an MCL. In light of the myriad contaminants present in drinking water, and the complexities of establishing numerical requirements that will adequately protect health, NRDC opposes limiting the Administrator's discretion to prescribe treatment techniques only to instances where he or she "makes a finding of overriding economic or technical constraints on monitoring."

S.2649 would require EPA to move forcefully to reduce human exposures to toxic substances in drinking water. How that goal is best accomplished should be left to the discretion of the Administrator. NRDC is further concerned that the term "overriding" could lead to extended litigation over whether the benefits of a particular treatment technique outweigh the costs in a given case. In our view, EPA needs to be able to consider all feasible regulatory options in fashioning remedial or preventive requirements for the protection of drinking water. An artificial hierarchy of response such as that proposed in the bill or in present law, will hinder rather than facilitate expeditious achievement of the objectives of the Act.

4. Monitoring for Unregulated Contaminants

NRDC strongly supports the inclusion in section 13 of the bill of a requirement that the Administrator promulgate regulations for all water suppliers to monitor for unregulated contaminants. It is inexcusable that in 1984 our drinking water supplies have still not been monitored for the presence of toxic contaminants, despite several random surveys suggesting that such contamination may be very widespread. Not only will monitoring answer pressing questions about the quality of individual supplies, but it will also create the data base for priority-setting for protective regulation. We also believe that consumers of drinking water are entitled to know which contaminants are present in their supply. Water purveyors should therefore be required to generate and provide that information on a regular basis.

While we urge enactment of section 13 to accomplish these objectives, there appear to be certain ambiguities in the section that should be clarified. First, in requiring monitoring for "every public water system," the Administrator is authorized to consider "system size and the contaminants likely to be found the system's drinking water." In addition, the Administrator is directed to give primacy states "the flexibility to add or delete contaminants, for individual systems, based on an approved assessment of what contaminants may be found in the system." Not only are the results of the Administrator's consideration of system size and "likely" contaminants, or the primacy states' "approved assessment" not made clear, but these provisions also suggest that all water suppliers will not in fact have to conduct monitoring. NRDC therefore urges the Subcommittee to specify a minimum limitation on the extent to which an individual supplier's duty to monitor can be reduced, so as to preserve the objective of monitoring the quality of all public drinking water supplies.

NRDC also suggests that once the baseline monitoring has been completed, subsequent surveillance monitoring be required in appropriate cases, as well as comprehensive update monitoring, to detect changes in drinking water quality over subsequent 3 to 5-year periods. In addition, NRDC recommends that notification of the results, rather than merely of the availability of those results, be provided to persons served by the system.

5. Restrictions on Hazardous Waste Injection

As discussed previously, underground injection is the most prevalent form of land disposal of liquid hazardous wastes. Reports submitted to EPA pursuant to RCRA by operators of injection wells indicate that injection of liquid hazardous waste has overtaken landfill disposal by a ratio of more than 10 to 1, and incineration of liquid waste by a ratio of more than 17 to 1.[1]

Because of the dangers inherent in this method of disposing of hazardous waste, both RCRA and SDWA require EPA to regulate undergound injection of hazardous waste. Serious shortcomings in

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[1] See recent EPA Hazardous Waste Survey, supra, p.8, note 1.

EPA's implementation of both statutes, however, have prompted amendments to prohibit or greatly restrict this practice. NRDC therefore strongly supports section 9(a) of S.2649, which would prohibit all hazardous waste injection above or into a drinking water source (Class IV wells), except pursuant to procedures "approved" under RCRA, Superfund or the Safe Drinking Water Act.

EPA's data indicate that injection below aquifers (Class I wells) is the principal method of deep well injection utilized for disposal of hazardous wastes. NRDC believes that this practice should also be prohibited unless a showing is made that the injection will not cause hazardous waste to migrate into or otherwise endanger drinking water sources.

It is urgent that underground disposal of toxic wastes be discouraged, and that generators of hazardous waste use alternative less environmentally damaging disposal methods. The practice of injecting hazardous wastes has increased as a land disposal option as state and federal RCRA programs have begun to restrict traditional landfilling. To stem the tide of underground injection, and the threat to groundwater represented by this practice, NRDC strongly supports enactment of a no-migration standard for all classes of underground injection. At the very least, a detailed inventory of Class I wells should be required to be expeditiously developed. An amendment to prepare such an inventory could provide as follows:

> (a) The Administrator, in cooperation with the States, shall compile and, not later than [a date 18 months

after enactment] submit to the Committee on Environment and Public Works of the United States Senate and the Committee on Energy and Commerce of the United States House of Representatives, an inventory of all wells in the United States which inject hazardous wastes. The inventory shall include the following information:

..(1) the location and depth of each well;

..(2) engineering and construction details of each, including the thickness and composition of its casing, the width and content of the annulus, and pump pressure and capacity;

..(3) the hydrogeological characteristics of the overlying and underlying strata, as well as that into which the waste is injected;

..(4) the location and size of all drinking water aquifers penetrated by the well, or within a one-mile radius of the well or within two hundred feet below the well injection point;

..(5) the location, capacity, and population served by each well providing drinking or irrigation water which is within a five-mile radius of the injection well;

..(6) the nature and volume of the waste injected during the one-year period immediately preceeding the date of the report;

..(7) the dates and nature of the inspections of the injection well conducted by independent third parties or agents of State, Federal, or local government;

..(8) the name and address of all owners and operators of the well and any disposal facility associated with it; and

..(9) such other information as the Administrator may, in his discretion, deem necessary to define the scope and nature of hazardous waste disposal in the United States through underground injection.

(b) the Administrator shall include in the report of the inventory described in subsection (a) recommendations for any necessary additional authority to prohibit or restrict injection practices that cause hazardous waste to migrate into or otherwise endanger drinking water sources.

NRDC also suggests inclusion of a requirement in S.2649 that underground drinking water sources down gradient of or penetrated by a Class I injection well be monitored:

> Sec. 1427....
> (2) monitoring of underground drinking water sources down gradient from or penetrated by a Class I injection well.

Such a modification should further assure that underground injection of hazardous waste will not contaminate groundwater.

6. Changes in Public Notification Requirements

Public apprehension about the quality and safety of drinking water has increased dramatically as well closings, hazardous waste disposal problems, and pesticide contamination incidents have received extensive media attention. Availability of information about the quality of particular supplies, and clear explanations of the significance of violations of SDWA requirements, will help educate the public. Such information can alert the public to dangerous situations in appropriate cases, or calm public fears where there is no threat to health represented by a violation.

NRDC is concerned that delegation to EPA of complete discretion to differentiate among more and less serious violations not result in even less information being available to drinking water consumers. Moreover, so-called "minor" or "technical" violations should not routinely be excluded from notification requirements because they can be indicative of a lessening of quality control that could ultimately jeopardize the safety of a supply.

Clearly, the public notification provisions have not functioned effectively in the past, due at least in part to lax enforcement by EPA and the primacy authorities in the states. To remedy the shortcomings, the requirements should be streamlined and rationalized. However, certain minumum standards should be specified in the law, including timely communications media requirements for serious violations.

A second public-access-to-information issue that greatly concerns NRDC is whether information "deal[ing] with the level of contaminants in drinking water" is fully available to the public as current section 1445(b) intends. To ensure that contaminant data will be available, NRDC recommends adoption of the following language at the end of section 1445(d):

> (3) Except for information for which there has been a showing described in paragraph (1), any records, reports or information obtained under this section shall be available to the public. Notwithstanding any other provision of this Act, information shall be disclosed to the public to the extent it deals with the level of contaminants in drinking water.

7. Exemptions

NRDC generally supports section 7 of S.2649, which would tighten the standards for the issuance of exemptions from compliance with National Primary Drinking Water Regulations. There is one criterion among those listed as justifications for extending an exemption for 3 additional years, however, that could prove the exception that swallows the rule. While subsections (i),(iii), and (iv) of proposed section 1416(a)(2)(B) set forth objective, measurable standards for granting an extension of time, subsection (ii) requires only that the system is taking all "practicable" steps to comply with the drinking water requirement at issue. Because "practicable" is not futher defined in the bill and has no judicially developed meaning, it could become a catch-all for a wide variety of questionable excuses for non-compliance. For this reason, NRDC strongly opposes inclusion of this non-criterion as a basis for exemption from a National Primary Drinking Water Regulation.

8. Suggested Additions to S.2649

a. Civil Actions by Public Water Systems and Other Persons

Under the current law, public water systems and individuals whose water supplies are contaminated by the polluting activities of others, have to rely upon sporadic enforcement by government agencies, or the admittedly inadequate private tort system[1] to abate the pollution or to reimburse them for expenses incurred in treating or replacing the contaminated water source. With the reduction in federal and state enforcement programs resulting from budget cuts, water suppliers and private citizens are increasingly forced to rely upon the private tort system for any redress. Creation of a private right of action in the SDWA would greatly enhance the ability of persons damaged by the activities of third parties to reach those who are responsible. The result of such private enforcement of drinking water regulations would be to raise the standard of care in areas of activity that result in contamination of drinking water while enabling injured parties to obtain redress where government cannot or will not act.

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[1] H. Rep. No. 97-12, Injuries and Damages From Hazardous Wastes - Analysis and Improvement of Legal Remedies, 97th Cong., 2d Sess. (1982).

An amendment to create such a private right of action could provide as follows:

> Civil Suits
>
> Section ___. Any person may bring an action in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code) (A) against any person causing or contributing to the presence of any contaminant in a source of drinking water if such contaminant may have any adverse effect upon the health of persons; or (B) against the Administrator or appropriate state agency for failure to regulate the source or sources of such contaminant under applicable statutory authorities.
>
> (1) The appropriate United States district court (as determined under the provisions of title 28 of the United States Code) shall have jurisdiction over any action brought under this subsection and may issue an order
>
> (A) requiring the person causing or contributing to the contamination concerned to (i) abate such contamination; (ii) provide reimbursement for all or part of the costs incurred in treating water to remove or reduce the level of contamination, or to obtain alternative drinking water supplies; or (iii) any combination of the actions referred to in subparagraphs (i) and (ii); or
>
> (B) requiring the Administrator to take appropriate actions under applicable statutory authority to identify and abate those sources of contamination.
>
> (2) Nothing in this subsection or in any other provision of this Act shall be construed to restrict or preempt any right which any public water system r any other person or class of persons may have under any statute or common law to seek enforcement in any Federal, State, or local court, or in any administrative proceeding, of any provision of this Act or any other relief regarding the contamination of any drinking water supply.

(3) The court, in issuing any final order in any action brought under this section may award costs of litigtion (including reasonable attorney and expert-witness fees) in accordance with Section 1449 (d).

b. Aquifer Protection

NRDC recommends that section 1424(e), the sole source aquifer protection provision of the Act, be amended to cover aquifers that provide a substantial source of drinking water to an area. This provision should also promote protection of aquifers by applying its restrictions on contaminating activities to federally-funded as well as federally-assisted projects, and by encouraging states to develop groundwater protection strategies.

The issue of groundwater protection is very complex and involves difficult questions of state and federal law. We look forward to future efforts by this Subcommittee directed towards expanding state and federal responsibilities to assure the safety and integrity of our vulnerable groundwater sources.

c. Restrictions on Surface Impoundments Containing Non-Hazardous Wastes

EPA's surveys of surface impoundments demonstrate that pits, ponds, lagoons and other surface impoundments containing technically non-hazardous waste pose a potentially major threat to groundwater. These impoundments are not presently regulated under any federal program, but NRDC believes they should be. We therefore urge the Subcommittee to direct EPA to promulgate regulations for the establishment of state programs to prevent surface impoundments containing wastes that are not defined as "hazardous" under RCRA, from endangering groundwater.

Such regulations should be promulgated by a date certain, and should contain design and operating criteria, provisions for assessment of the impacts of existing impoundments on groundwater, and retrofit or other corrective action requirements for impoundments found to pose a threat to groundwater.

Surface impoundments containing non-hazardous waste pose a potentially major source of groundwater contamination. Because of the large numbers and variety of such impoundments, they must be assessed and controlled if groundwater quality is to be preserved and protected. For this reason, NRDC asks the Subcommittee not to defer consideration of this problem and its possible solutions to some indefinite future time. Like the problem of leaking underground storage tanks, non-hazardous surface impoundments warrant immediate legislative attention.

Conclusion

As stated above, NRDC strongly supports S.2649, with the suggested modifications and additions we have described. Drinking water has been a neglected resource for years and has suffered a decline in quality across the country as a result. S.2649 represents a well-conceived effort to strengthen the Safe Drinking Water Act by establishing a national health protection goal for drinking water, and by requiring EPA to set new drinking water standards, to initiate a monitoring program to identify contaminants that should be regulated, to curb injection practices that threaten groundwater, and generally to expand federal and state protection of drinking water quality.

Renewed Congressional concern about drinking water is appropriate in light of continuing disclosures of serious contamination problems. NRDC welcomes that concern and intends to work diligently for passage of these amendments.

TESTIMONY OF
ED HOPKINS

CLEAN WATER ACTION PROJECT

My name is Ed Hopkins, Mr. Chairman, and I am here today representing the Clean Water Action Project (CWAP), a national, non-profit public interest organization which has worked for more than a decade with citizens and consumer organizations throughout the country to stop water pollution and safeguard drinking water supplies. I appreciate the opportunity to present CWAP's views on one of the nation's most important public health laws, the Safe Drinking Water Act.

Nearly a decade after Congress passed the Safe Drinking Water Act, this legislation is in need of significant improvements to provide adequate protection to the public. The intention of Congress, to protect consumers from waterborne disease, has not been achieved. In a number of important respects-- especially in regard to standard-setting, enforcement and monitoring-- the Environmental Protection Agency has failed to implement the statute.

Congress, recognizing our limited knowledge of the health effects of low levels of toxic chemicals in drinking water, directed the EPA to establish standards for any contaminant which may have any adverse effect upon health. But the EPA has ignored the law's preventative basis for standard-setting and continues to rely upon less than two dozen Maximum Contaminant Levels (MCLs) despite the fact that hundereds of synthetic organic chemicals have been identified in treated drinking water throughout the nation and that pesticides have contaminated the groundwater of eighteen states. Even the most commonly found toxic contaminants have yet to be regulated.

The evidence of widespread drinking water and groundwater contamination, based on well closings and periodic surveys, is increasing. A three-year old Council on Environmental Quality study found that thousands of public water wells serving millions of people have been closed owing to contamination by toxic chemicals. And EPA's National Groundwater Supply Survey, which discovered that 29 percent of the public water wells it tested at random were contaminated with trace levels of organic chemicals, clearly justifies additional monitoring of public water supplies. Without increased requirements for monitoring, drinking water contamination will continue to be discovered largely by accident, only after the public is exposed to dangerous contaminants.

CWAP believes that Congressional action is warranted to establish a public health philosophy based on preventing disease. Without a strong mandate from Congress it seems unlikely, based on its ten-year track record, that EPA will take steps adequate to protect the public. For many years the Agency has had too much discretion in implementing the drinking water program and this discretion has left the public without needed protection. It is time for Congress to take the initiative and provide EPA with more specific direction and deadlines for action.

Perhaps the most important element of a drinking water program that relies on prevention of disease is effective protection of groundwater quality. Protecting groundwater is implicit in the goals stated in Section 1 of S. 2649. The need for federal legislation to protect groundwater is given further urgency by the readily apparent weaknesses in the groundwater protection strategy the EPA proposed in January, 1984. The future costs of neglecting the quality of groundwater resources are likely to be significant-- so great that the claims made on the federal government to pay the cost of groundwater cleanup or of procuring alternative sources of drinking water could far outstrip the costs of providing protection. By establishing a framework for federal, state and local governments to address groundwater protection now, Congress may avoid larger costs in the future. While recognizing that too few legislative days remain in this session of Congress for the Committee to accord the subject of groundwater protection the consideration it deserves, CWAP believes that initiating legislation this year will help focus the debate and pave the way for action in the next Congress.

S. 2649 is a good bill which addresses many of the problems with the federal drinking water program. It would expedite the issuance of additional drinking water standards; improve the enforcement mechanisms available to EPA; require water systems to monitor for unregulated contaminants; establish additional safeguards for the underground injection of hazardous waste, and; provide technical assistance to small water systems. If enacted, the bill's provisions would provide significant additonal safeguards for public health. CWAP's specific comments on the bill follow.

SECTION 2. DECLARATION OF GOALS AND POLICY.

CWAP supports adding a statement of goals to the Safe Drinking Water Act and generally agrees with the goals proposed in the bill. While recognizing the crucial rights and responsibilities of the states in protecting groundwater and in assuring safe supplies of drinking water, Section 1400(b) seems to neglect the reality of and the need for a role for the federal government. By enacting numerous environmental protection statutes over the last decade, Congress has already provided the federal government with a number of important responsibilities, including setting national health standards for drinking water, regulating landfilling, underground injection and transportation of hazardous waste, and cleaning up Superfund sites. The federal government also has an appropriate-- but as yet unrecognized-- role to play in regulating the management of interstate aquifers and establishing uniform minimum standards to control activities that threaten groundwater, so as to avert the creation of pollution havens. CWAP encourages the Committee to amend this Section to make it clear that the federal government does have a legitimate role to play in protecting groundwater and safeguarding drinking water supplies.

SECTION 3. NATIONAL PRIMARY DRINKING WATER STANDARDS.

CWAP strongly supports the approach of giving EPA deadlines for promulgating additional MCLs. Without this impetus, progress in this setting additional drinking water standards for toxics is likely to be very slow. Since EPA has already begun, however slowly, to regulate the substances listed in S. 2649, Congress cannot be accused of taking on functions which would be more properly left to scientists. It would merely be providing a much-needed boost to the Agency's tortuous regulatory process.

Allowing EPA to promulgate health goals and MCLs simultaneously will expedite the standard-setting process by at least six months. CWAP does not object to re-naming "recommended maximum contaminant levels" as "maximum contaminant level goals", but the report language should make it clear that no substantive change in the current law is intended. This clarification is important lest the courts perceive some additional significance in what we understand is merely a change in wording to accommodate the water supply industry by eliminating any potential confusion between RMCLs and MCLs.

This section appropriately provides flexibility for the Administrator not to proceed with promulgating an MCL for substances that the Agency has begun to regulate. CWAP believes, however, that the language in the bill-- "... a national primary drinking water regulation is not necessary because the levels of such contaminant currently found in public water systems do not represent a threat of a known or anticipated adverse effect on the health of persons"-- undermines the Administrator's statutory authority to set standards for contaminants "which... may have any adverse effect on the health of persons." CWAP strongly supports the retention of this traditional standard because it does not demand absolute proof that exposure to drinking water contamiants causes disease and it allows the Administrator to act preventively. In keeping with the intent of this standard, CWAP suggests that this phrase in S.2649 be amended to read: "... a national primary drinking water regulation is not necessary because such contaminant represents no known or anticipated adverse effect on the health of persons." This proposed change is justified because of our lack of knowledge of levels of contamination that may cause adverse health effects: it errs on the side of providing additional protection to public health.

CWAP also suggests a change in the wording of Section 1412(b)(C) to allow the Administrator to put contaminants on the priority list for possible regulation based on occurrence or toxicity rather than occurrence and toxicity. The current language contradicts the concept of national primary drinking water standards, since a highly toxic substance such as a pesticide might not be eligible for inclusion on the list of contaminants to be regulated simply because its use may be limited to a distinct region of the country. Drinking water standards should be national in scope. If EPA could demonstrate that some substances for which MCLs are established (such as radionuclides or certain pesticides) are highly unlikely to be found in some areas, CWAP would support giving the Agency the authority to permit the elimination of monitoring requirements for those substances in that region.

CWAP strongly supports the concept of setting drinking water standards on the basis of best available treatment technology. The technology-based approach offers the prospect of protecting public health from entire classes of widespread contaminants, such as volatile organic chemicals. This regulatory mechanism has proved itself viable under other major environmental statutes and it is far preferable to the contaminant-by-contaminant approach that has characterized the Act's implementation for the past decade.

The technology-based approach is unreasonably constrained, however, by requiring the Administrator to make a finding of "overriding economic and technological constraints on monitoring" (Section 1412(b)(3)(A)) before requiring the use of a treatment technique. A preferable alternative would be to give the Administrator the authority to require the use of a treatment technique whenever, in his judgment, that approach would better serve public health. If that degree of flexibility is unacceptable, CWAP would urge the Committee to at least delete the word "overriding", which would make it more difficult for the Administrator to require the use of treatment techniques than under current law.

Requiring filtration for all water systems served by surface water and disinfection for all water systems is a reasonable and prudent step. Such protections are so basic that universal requirements that these techniques be used is warranted.

SECTION 4. ENFORCEMENT

The General Accounting Office report ("States' Compliance Lacking in Meeting Safe Drinking Water Regulations", March 3, 1982) illustrates the need for enhanced enforcement of the Act. CWAP therefore supports the amendments to Section 1414 of the Act to provide EPA with the non-discretionary authority to issue administrative orders to ensure compliance with the law. The Administrator has the authority to use this enforcement tool under other environmental sta utes. Requiring EPA to use administrative orders to enforce the law in cases where primacy states have failed to act will result in better enforcement and improved compliance, since the Agency will not be compelled to initiate a federal court proceeding to enforce the law.

SECTION 5. PUBLIC NOTIFICATION

CWAP strongly supports the concept that consumers have the right to timely information concerning the quality of the water they are drinking. Unfortunately, the law's current notification process, designed both to warn consumers of acute water quality problems and to encourage a willingness on the part of consumers to pay higher rates to improve the quality of their drinking water, has not been successful. In part, this is due to a reluctance on the part of many water suppliers to comply with the law and a reluctance on the part of the states and EPA to enforce it.

While understanding the need for flexibility in administering the public notification provision, CWAP urges the Committee to incorporate additional safeguards into the language of Section 1414(c) or report language to ensure that the law's original intent is maintained and carried out. Since many consumers do not receive water bills, it is essential that notice of violations be issued to the mass media. We see no harm that could come of notifying consumers of violations via their water bills as well as through the mass media. Notice of acute violations should be given immediately. "Serious" violations should be defined so as to include violations of any MCLs, treatment technique requirements and monitoring and reporting regulations. In addition, notice of variances or exemptions from any of the law's requirements should be given quarterly. It would also be appropriate for water systems to notify their consumers if an unregulated substance for which EPA has issued a health advisory is detected.

SECTION 6. VARIANCES

CWAP endorses the changes proposed in the variance procedure which would allow a system to obtain a variance only after the application of best available technology and require a system to enter into a compliance schedule at the time of receiving a variance rather than a year later. The net effect of these changes is to ensure that a water system makes all possible progress toward compliance. Deletion of the word "generally" will push water systems toward installing technologies capable of improving drinking water quality rather than encouraging the use of traditional technologies simply because they are in general use and therefore assumed to be sufficient to protect public health.

We strongly support the definition of best available technology contained in this section. For too long, the ability of the Administrator to require large systems to use more sophisticated treatment systems that could provide high quality water to their consumers has been hindered by the inability of small systems' consumers to install the same technologies. This provision makes it clear that the large public water systems that serve 90 percent of the population can be required to use technologies that small systems would not be able to afford, and at the same time, the concept of requiring best available technology will ensure that consumers served by small systems will receive the best drinking water that that system is capable of supplying. CWAP believes this provision will greatly increase the quality of the public's drinking water. It is potentially the most important change proposed in this bill and we strongly support it.

SECTION 7. EXEMPTIONS

CWAP supports this provision. It will ensure that small, financially needy water systems will make all reasonable progress toward meeting the requirements of the Act while allowing for continued extensions for the smallest systems.

SECTION 8. ENFORCEMENT

CWAP supports this section and believes that it will enhance enforcement of the underground injection provision by requiring the Administrator to initiate enforcement orders and civil actions in a timely way should a state fail to act. If groundwater is being contaminated, it is essential that EPA be empowered to enforce the law expeditiously and to levy meaningful penalties.

SECTION 9. RESTRICTIONS ON UNDERGROUND INJECTIONS OF HAZARDOUS WASTE AND REGULATION OF STATE PROGRAMS

CWAP strongly endorses the prohibition on injecting hazardous wastes into or above aquifers which supply drinking water. The practice of injecting hazardous wastes into and above drinking water sources is inherently unsafe; this restriction is long overdue. CWAP also supports the cleanup provisions for Class III wells and the requirement that monitoring be undertaken down gradient from Class I wells. We urge the Committee to specify that operators of Class I walls should be required to monitor for the substances they inject as well as new compounds that could be formed as a result of the interaction of wastes, not simply for the MCLs promulgated under the Safe Drinking Water Act. CWAP also supports eliminating the ability of the EPA to exempt from protection groundwaters containing between 3,000 and 10,000 TDS since some communities may rely on such poor quality groundwater as their sole source of drinking water.

SECTION 11. TECHNICAL ASSISTANCE

Non-compliance with the Act's requirements is largely concentrated among smaller systems, where the lack of properly trained water treatment personnel is a major impediment. To address this problem, S.2649 includes a separate authorization to provide small water systems with technical assistance to help them comply with the Act. CWAP supports this provision.

SECTION 13. MONITORING FOR UNREGULATED CONTAMINANTS

CWAP strongly supports the concept that all public water systems should monitor their drinking water for commonly found industrial contaminants and pesticides. Monitoring for the small list of contaminants for which EPA has established MCLs is simply not sufficient to protect public health. Chemical contaminants are now discovered accidentally, only after the public has been exposed to them, and this is clearly unacceptable.

Although this provision represents a step in the right direction, we believe that it is inadequate to provide ongoing public health protection. Requiring only one set of drinking water quality tests is not sufficient to protect the public. Because the quality of raw water supplies changes, we believe that, at a minimum, public water supplies should be required to test their water for unregulated contaminants every two-to-three years. Larger systems, those serving populations of 10,000 or more, should be required to perform such tests at least annually. Even the cost of testing water for the Clean Water Act list of priority pollutants-- a much larger list than EPA would probably require water systems to test for-- is relatively small (about &750 to analyze for the entire list, according to several certified labs we consulted). A requirement for on-going testing of common, unregulated drinking water contaminants would not represent an unacceptable burden on consumers.

This provision would be further enhanced by requiring follow-up testing of supplies that were shown to contain contaminants. The current language requires no action by the water supplier or the state if the drinking water does contain potentially dangerous levels unregulated contaminants.

The Committee should emphasize in report language that states should not be permitted to delete contaminants form the list EPA promulgates without convincing evidence that they are extremely unlikely to be detected. This test should be a difficult one to meet since many communities have found contaminants in their drinking water that could not have reasonably been anticipated to be there.

Consumers want to know about the quality of the water they are drinking. The water systems should not only notify their customers of the availability of the results of the monitoring program, but should be required to provide information on the concentrations and potential health effects of any contaminants for which the EPA or a state has issued a health advisory. Nineteenth century drinking water treatment technologies cannot remove twentieth century chemical contaminants. Consumers will be more willing to support the rate increases necessary to modernize their water systems when they are convinced that their drinking water may contain unhealthy contaminants.

CONCLUSION

As stated above, CWAP strongly supports S.2649, although we have suggested a few modifications which we hope that the Committee will consider. This bill and the few changes that CWAP has proposed would move EPA in the direction that Congress intended a decade ago when it passed the Safe Drinking Water Act-- toward drinking water free of contaminants that may cause disease. As evidenced by the booming sales of home water treatment devices and bottled water, there is strong public support for drinking water free of micorbiological and chemical contaminants. CWAP urges the Committee to take swift action on this bill, and we are convinced that its enactment will significantly improve the quality of drinking water.

STATEMENT
OF THE
CONFERENCE OF STATE SANITARY ENGINEERS
AND THE STATE OF ILLINOIS
BEFORE THE SUBCOMMITTEE ON TOXIC SUBSTANCES
AND ENVIRONMENTAL OVERSIGHT
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON THE
SAFE DRINKING WATER ACT AMENDMENTS OF 1984

BY: IRA M. MARKWOOD
DIVISION MANAGER
DIVISION OF PUBLIC WATER SUPPLIES
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
AND
CHAIRMAN,
CONFERENCE OF STATE SANITARY ENGINEERS
217/785-8653

THANK YOU, MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE, I APPRECIATE THIS OPPORTUNITY TO TESTIFY ON BEHALF OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY, STATE OF ILLINOIS, AND THE CONFERENCE OF STATE SANITARY ENGINEERS. I REQUEST THAT THIS STATEMENT BE ACCEPTED INTO THE RECORD OF THIS HEARING.

I AM IRA M. MARKWOOD, MANAGER OF THE DIVISION OF PUBLIC WATER SUPPLIES OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY, AND CHAIRMAN OF THE CONFERENCE OF STATE SANITARY ENGINEERS. IN THESE CAPACITIES, I AM SPEAKING FOR THE MORE THAN FORTY-FIVE STATES WHICH ARE MEMBERS OF THE CONFERENCE.

I hold the degrees of Bachelor of Chemical Engineering and Master of Science in Chemical Engineering. My experience in water treatment and supply goes back to 1946. I am a Registered Professional Engineer in Illinois, New Jersey and New York, and I have been with the Illinois Environmental Protection Agency since 1972; as Manager of the Division of Public Water Supplies since 1974.

The Conference of State Sanitary Engineers is an organization founded in May of 1920, of people in state governments responsible for environmental programs. Its purpose is to promote the public health, to coordinate public health engineering activities of official state and Territorial health organizations; to encourage the interchange of experience among state health and environmental professionals in official administrative positions, and to collect and make accessible to all state health and environmental program managers such information and data as might be of assistance to them in the proper fulfillment of their duties. The distribution of safe, clean water was one of the earliest interests of the Conference, and continues to be a major subject of concern.

The provision of safe drinking water is a multi-faceted operation, and no part can be ignored in preference to another. We cannot afford to reduce or discontinue our efforts to protect against the "traditional" waterborne diseases in order to put into effect new protective measures. Any improvement in protection must be in addition to, and not in place of, what is now being done. Consequently, when adding to the program we must look at the effect on the existing protective measures.

SECTION 3 OF THE PROPOSED AMENDMENTS TO THE SAFE DRINKING WATER ACT CONTAINS PROVISIONS WHICH MAY CAUSE APPRECIABLE PROBLEMS. SUBSECTION (A) CONFERS ON EXISTING REGULATIONS A PERMANENCE A GOOD MANY DO NOT DESERVE. FOR EXAMPLE, THERE ARE QUESTIONS ABOUT THE MICROBIOLOGICAL, BARIUM, FLUORIDE AND RADIONUCLIDE STANDARDS. THEY AND OTHERS MUST BE EXAMINED IN THE LIGHT OF NEW KNOWLEDGE OBTAINED SINCE THEIR PROMULGATION. THEY WERE ADOPTED HURRIEDLY, AND URGENTLY NEED REVIEW IN DEPTH. UPGRADING THEIR STATUS WILL IN EFFECT GIVE THEM MORE CREDIBILITY THAN THEY DESERVE, AND WILL PROBABLY DELAY, IF NOT CANCEL, THIS PROCESS. IT WOULD BE BETTER TO REQUIRE ACCELERATION OF THE REVIEW.

PASSAGE OF SECTION (B) IN ITS PRESENT FORM WILL BE DISASTROUS TO THE WATER SUPPLY PROGRAM. THE SETTING OF MAXIMUM CONTAMINANT LEVELS (MCL) IMPLICITLY REQUIRES MONITORING. THE COST OF ANALYSES REQUIRED BY THE PROPOSED PARAGRAPHS (I)(A) AND (B) ARE STAGGERING. AT PRESENT THERE ARE APPROXIMATELY 3600 PUBLIC WATER SUPPLY WELLS IN ILLINOIS. TO DETERMINE COMPLIANCE WITH THE PROPOSED MCL'S EACH WELL, NOT EACH OF THE 1200 SYSTEMS THEY REPRESENT, MUST BE SAMPLED AND ANALYZED. STATE LAW REQUIRES THAT THIS BE DONE AT NO COST TO THE SYSTEM. THE ESTIMATED COST TO THE STATE, FOR ONE ROUND OF SAMPLING, IS APPROXIMATELY TWO MILLION DOLLARS. THE COMPLETE ESTIMATED BUDGET FOR FY 85 FOR THE DIRECT PUBLIC WATER SUPPLY PROGRAM INCLUDING BOTH STATE AND FEDERAL MONIES, IS $1,804,600. ASSUMING THAT THE ANALYSES CAN BE SPREAD OVER FIVE YEARS, THE ANNUAL DRAIN WILL BE $400,000. AT PRESENT IN ILLINOIS THIS PROGRAM IS UNDERFUNDED. BASED ON THE FY 85 ESTIMATE THE FUNDING HAS DROPPED BY OVER $340,000 FROM THE FY 81 VALUE, WHICH WAS THE MINIMUM NEEDED TO PROVIDE AN ADEQUATE DRINKING WATER PROGRAM. SINCE THEN INFLATION HAS FURTHER REDUCED THE ACTUAL VALUE OF THE RESOURCES, SO THAT THE DECLINE OF THE PROGRAM HAS BEEN GREATER THAN DIRECT COMPARISON OF THE DOLLAR AMOUNTS WOULD INDICATE. FURTHER REDUCTION IN THE EXISTING PROGRAM CAUSED BY THE PROPOSED AMENDMENTS WOULD MAKE IT IMPOSSIBLE TO MEET THE REQUIREMENTS OF THE FEDERAL STATUTE AND REGULATIONS, AND WOULD NECESSITATE RECONSIDERATION OF ACCEPTANCE OF PRIMACY. THE BURDEN OF COST WOULD THEN FALL ON THE SUPPLIES THEMSELVES. FOR A HIGH PERCENTAGE THE ANALYSIS EXPENSE WOULD BE GREATER THAN THE COMPLETE ANNUAL BUDGET FOR OPERATION OF THE SUPPLY.

EVEN ASSUMING THE PROVISION OF ADEQUATE RESOURCES FOR ANALYSIS OF THE SAMPLES, THERE ARE NOT NOW SUFFICIENT FACILITIES AND TRAINED PERSONNEL TO PROVIDE THE ANALYSIS OF ALL THE SAMPLES. THE CAPITAL COST FOR THE EQUIPMENT AND HOUSING FOR THE STATE OF MINNESOTA ALONE HAS BEEN ESTIMATED AT SIX MILLION DOLLARS. FURTHERMORE, EACH LABORATORY WOULD HAVE TO BE CERTIFIED. IF WORK WERE STARTED IMMEDIATELY, IT WOULD PROBABLY TAKE AT LEAST FIVE YEARS TO PROVIDE THE FACILITIES, AND EVEN LONGER TO PROVIDE ADEQUATELY TRAINED STAFF FOR THE LABORATORIES TO REACH THE STATE WHERE THEY COULD HANDLE THE LOAD NATIONWIDE. CERTIFICATION PROCESSES WOULD ADD TWO TO THREE YEARS, AT LEAST, BEFORE ALL WAS IN READINESS.

ANOTHER ASPECT OF THE PROBLEM IS THE COLLECTION OF SAMPLES. WHILE SOME STATES PROVIDE SAMPLE COLLECTORS,IN MANY, INCLUDING ILLINOIS, SAMPLES ARE COLLECTED BY EACH SUPPLY'S SAMPLE COLLECTOR. FOR ALL BUT TRIHALOMETHANE ANALYSIS IF THE COLLECTOR DOES NOT USE THE PROPER TECHNIQUE THE ANALYSIS WILL SHOW A WORSE SITUATION THAN EXISTS.

For trihalomethanes (THM's) a well-trained sample taker is required. A poor technique will result in analysis results which will appear better than the actual content. At present only supplies serving over 10,000 people must test for this substance. The professionals at these larger supplies are usually competent after training to take these samples correctly.

The technique for sampling for the substances mentioned in Section 3(a) of this bill is identical to that for THM's. For those supplies now taking THM samples this would pose no problem. But in Illinois there are 1758 small supplies where the competence of the collector cannot be assured. Almost all of these supplies would not be willing to pay the cost of hiring sample collectors competent to take THM samples. Therefore the State would have to provide the sample takers. This cost would have to be added to the analysis cost.

The question of cost has been gone into in such detail, not because it is thought to be more important than the public health effect, but for the exact opposite reason. The resources to be used if this bill includes these provisions will have to be taken away from existing already inadequate programs. Experience in this country over the past century has shown that we know how to prevent acute waterborne disease and even now when that knowledge is disregarded episodes of disease occur. Health effects for a high percentage of substances listed in Section 3 are not known, or are inadequate to use for setting MCL's. Therefore we recommend that MCL's be promulgated only for those for which adequate knowledge of the effects

ON HUMAN HEALTH ARE KNOWN. THIS DOES NOT MEAN THAT WE MUST HAVE COMPLETE KNOWLEDGE, BUT WE MUST HAVE SUFFICIENT TO MAKE A REALISTIC ESTIMATE OF THE RISK. ALSO, THE MCL'S SHOULD BE SET ONLY FOR THOSE SUBSTANCES WHICH APPEAR IN DRINKING WATER. THE REMAINDER SHOULD APPEAR ON THE PRIORITIZED LIST SET UP BY THE ADMINISTRATOR, AS REQUIRED BY THE AMENDMENTS. BUT THE TIME LIMIT, INSTEAD OF BEING FIXED, SHOULD BE BASED ON THE AVAILABILITY OF HEALTH EFFECTS. FOR EACH SUBSTANCE FOR WHICH AN ADEQUATE KNOWLEDGE OF HEALTH EFFECTS IS DETERMINED, AN MCL SHOULD BE PROMULGATED WITHIN 18 MONTHS. ADEQUATE FUNDS ANNUALLY FOR RESEARCH INTO THE HEALTH EFFECTS MUST BE PROVIDED.

THE REQUIREMENTS CONCERNING THE PROMULGATION OF TREATMENT TECHNIQUES IN PARAGRAPHS (3)(A) AND (B) ARE AN EXCELLENT ADDITION TO THE SAFE DRINKING WATER ACT.

THE STATE OF ILLINOIS NOW REQUIRES FILTRATION (IN FACT COMPLETE TREATMENT INCLUDING DISINFECTION, FLOCULATION, COAGULATION, SETTLING AND FILTRATION) FOR ALL SURFACE WATER SOURCES, AS WELL AS DISINFECTION OF ALL BUT SMALL PUBLIC WATER SUPPLIES WHICH MEET STATUTORY REQUIREMENTS. HOWEVER, THERE ARE A NUMBER OF STATES WHICH DO NOT HAVE THESE REQUIREMENTS AND WOULD NOT LIKE TO HAVE THEM AS NATIONAL LAW, EVEN THOUGH THE STATE OF ILLINOIS IS IN FAVOR OF THESE PARAGRAPHS.

SINCE THE SCIENTIFIC BACKGROUND FOR SETTING MCL'S IS EXTREMELY IMPORTANT, REVIEW OF PROPOSALS AND COMMENTS BY DISINTERESTED COMPETENT SCIENTIFIC BODIES SHOULD BE REQUIRED, NOT DISCRETIONARY.

SECTION 4 OF THE BILL CONTAINS PARTS WHICH WILL CREATE PROBLEMS, AND PARTS WHICH ARE GENERALLY IMPROVEMENTS ON THE SAFE DRINKING WATER ACT.

The change to Section 1414(a)(1)(b), which requires the Administrator to act within 30 days after notification, should be deleted. This will be counterproductive.

Unlike other areas of pollution, the relationship between the regulated and the regulators has been close when both are professionals in the field. Consequently water supply management has been traditionally anxious to use the expertise of the state and local regulatory agencies, and quite open about exposing their problems. The aim of the regulators is to achieve compliance. Just as war is described as the failure of diplomacy, formal enforcement action can be labelled as the failure of the compliance process. Where the water supply people are not professionals in the field, formal enforcement may be needed, since the developer, home-owners association, or members of a municipal board may not understand the problems, and give them low priority, if any. Limiting the amount of time available to reach compliance will set up an adversary position which will result in deterioration of the relationship between professionals, and the resultant hiding of problems rather than seeking assistance. Since a good state water supply cannot be run without cooperation of the majority of the regulatees, such a breakdown of confidence will make the supplying of safe drinking water less assured. There must be discretion available to determine when formal enforcement will occur.

For those for whom efforts to obtain compliance fail, the addition of administrative orders to the arsenal of available actions is a reasonable step, if the orders are used wisely. The requirement for

THE AVAILABILITY OF CONFERENCE BETWEEN THE ADMINISTRATOR AND THE STATE, AND FOR THE AVAILABILITY OF A PUBLIC HEARING, WILL WORK TO MAKE THE USE OF ADMINISTRATIVE ORDERS A HELPFUL TOOL FOR THE DRINKING WATER PROGRAM.

SECTION 5 CONTAINS SOME LONG-NEEDED CHANGES TO THE PUBLIC NOTIFICATION REQUIREMENTS. WE STRONGLY SUPPORT THIS SECTION.

THE FIRST CHANGE IN SECTION 6, REQUIRING THE INSTALLATION OF EQUIPMENT IN ALL CASES WHERE A VARIANCE IS TO BE GRANTED, IS NOT SUPPORTED BY LOGIC. IT DOES NOT ALLOW THE USE OF SCIENTIFIC OR ENGINEERING KNOWLEDGE WHICH MAY DETERMINE THAT THE COST OF THE EQUIPMENT AND ITS INSTALLATION AND OPERATION WILL BE WASTED. FOR EXAMPLE, ONE OF THE APPROVED METHODS FOR REMOVING BARIUM IS BY ION EXCHANGE. BUT BARIUM PRESENT AS COLLOIDAL BARIUM SULFATE WILL PASS UNCHANGED THROUGH AN ION EXCHANGER. IF THIS REQUIREMENT IS KEPT, A USELESS PIECE OF EQUIPMENT MUST BE INSTALLED BEFORE A VARIANCE IS GRANTED. THIS PROVISION WILL RESULT IN CONTINUED NON-COMPLIANCE, FAILURE TO APPLY FOR A VARIANCE, AND INCREASED ENFORCEMENT COSTS BOTH TO THE VIOLATORS AND THE PRIMACY AGENCY, WITH NO GAIN IN THE SAFETY OF THE DRINKING WATER.

WE FIND NO PROBLEMS WITH THE REMAINDER OF THIS SECTION.

SECTION 7 CONTAINS CHANGES WHICH MATCH PREVIOUS CHANGES REMOVING THE TERMS "INTERIM" AND "REVISED" FROM THE ACT. WE HAVE PREVIOUSLY COMMENTED ON THIS AND REFER YOU TO THESE COMMENTS. WE FIND NO PROBLEMS WITH THE REMAINDER OF THIS SECTION.

The content of Section 8 of the proposed amendments closely parallels Section 4. We refer you to our previous comments on that Section.

The addition of Section 1426 to the Safe Drinking Water Act, as stated in Section 9 of the proposed amendments, is an improvement, except that geologic and hydrologic conditions must be taken into account, and may require more than one quarter mile separation between an injection well and a drinking water well. The paranthetical statement should be changed to read, "(at least within one quarter mile at the injection well bore, or more, depending on the local hydrologic and geologic conditions.)"

The requirement to inventory all hazardous waste injection wells may prove to be unrealistic, since much of the information is unavailable. The resultant report should be used as a base for enlargement of the inventory, and will be completely unreliable as a definitive indicator of existing conditions. After a few years of investigation and of obtaining all of the requested information from new wells, the reliability of the data will improve to the point where it will be satisfactory for decision-making as may be indicated.

The contents of Sections 10 and 11 of the proposed amendments will assist in assuring the provision of safe drinking water, except that more money should be available for technical assistance.

While Section 12 increases and extends appropriations for the drinking water program, the amounts generally fall short of the needs.

THIS IS PARTICULARLY TRUE OF THE SUMS AUTHORIZED FOR RESEARCH AND FOR STATES PROGRAM GRANTS. THEY FALL FAR SHORT OF THE AMOUNTS NEEDED.

THE ADDITION BY SECTION 13 OF A NEW PART (A)(2) HAS A FLAW. THERE IS NO STANDARD OR GUIDANCE GIVEN FOR PLACING SUBSTANCES ON THE LIST TO BE MONITORED. HERE, AS IN SECTION 3 OF THE PROPOSED AMENDMENTS THE SAMPLE COLLECTION AND ANALYSIS COSTS MAY BE EXHORBITANT AND BEYOND THE RESOURCES OF THE ENTITY RESPONSIBLE FOR THE EXPENSE. ALSO, THE FACT THAT SYSTEMS SERVING UNDER 150 SERVICE CONNECTIONS WILL BE REIMBURSED WILL NOT ALLEVIATE THIS PROBLEM. WHERE THE STATE MUST BY LAW BEAR THE EXPENSE, WILL IT BE REIMBURSED FOR MONITORING COSTS FOR SUPPLIES WHICH WOULD BE REIMBURSED IF THEY HAD THAT RESPONSIBILITY? SUPPLIES SERVING FROM 150 TO ABOUT 1000 SERVICE CONNECTIONS MAY HAVE GREAT PROBLEMS IN OBTAINING ADEQUATE FUNDS FOR MONITORING OF THESE SUBSTANCES. WE NOW LOOK FOR EXTREMELY MINUTE QUANTITIES. THEREFORE WE CAN EXPECT THE COST PER ANALYSIS TO INCREASE. ALSO, AS PREVIOUSLY STATED, THE FACILITIES FOR COLLECTING AND ANALYZING THE SAMPLES EITHER MAY NOT EXIST, OR MAY BE INSUFFICIENT TO HANDLE ALL THE SAMPLES REQUIRED.

THESE COMMENTS ARE MEANT TO BE CONSTRUCTIVE, AND TO AID IN IMPROVING THE QUALITY OF DRINKING WATER SUPPLIED IN THIS COUNTRY. THEY REPRESENT A GENERAL AGREEMENT OF THE WATER SUPPLY PROGRAM MANAGERS OF THE STATES.

I THANK YOU FOR THE OPPORTUNITY TO PRESENT THIS STATEMENT TO YOU, AND WILL BE PLEASED TO ANSWER ANY QUESTIONS.

II

98TH CONGRESS
2D SESSION

S. 2649

To amend the Safe Drinking Water Act (title XIV of the Public Health Service Act) to authorize funds for fiscal years 1984, 1985, 1986, and 1987, 1988, 1989, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MAY 8 (legislative day, APRIL 30), 1984

Mr. DURENBERGER (for himself and Mr. HUMPHREY) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To amend the Safe Drinking Water Act (title XIV of the Public Health Service Act) to authorize funds for fiscal years 1984, 1985, 1986, and 1987, 1988, 1989, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Safe Drinking Water Act Amendments of 1984".

DECLARATION OF GOALS AND POLICY

SEC. 2. Part A of the Safe Drinking Water Act is amended by adding the following new section:

"DECLARATION OF GOALS AND POLICY

"SEC. 1400. (a) The objectives of this Act are to assure that all public water systems provide a safe supply of drinking water to the people of this Nation and to protect the ground water resources of this Nation from contamination. In order to achieve these objectives it is hereby declared that, consistent with the provisions of this Act—

"(1) it is the national goal that all public water systems provide drinking water free of any contamination that may have any adverse effect on the health of persons;

"(2) it is the national goal that all underground sources of drinking water be protected from any contamination that may have any adverse effect on the health of persons; and

"(3) it is the national policy to provide adequate controls on activities that threaten to contaminate the ground water resources of this Nation in order to prevent any such contamination.

"(b) It is the policy of the Congress to recognize, preserve, and protect the responsibilities and rights of States to assure that public water systems provide a safe supply of drinking water and that underground sources of drinking water are protected from contamination.".

NATIONAL PRIMARY DRINKING WATER REGULATIONS

SEC. 3. (a) Section 1412(a) of the Safe Drinking Water Act is amended to read as follows:

"(a) Effective on the date of the enactment of the Safe Drinking Water Act Amendments of 1984, each national interim primary drinking water regulation promulgated under this section before such date of enactment shall be deemed to be a national primary drinking water regulation under subsection (b). No such regulation shall be required to comply with the standards set forth in subsection (b)(2) unless such regulation is amended to establish a different maximum contaminant level after the date of the enactment of such amendments.".

(b) Section 1412(b) of the Safe Drinking Water Act is amended by striking paragraphs (1), (2), and (3) and inserting:

"(1)(A) Not later than eighteen months after the date of the enactment of the Safe Drinking Water Act Amendments of 1984, the Administrator shall—

"(i) simultaneously propose maximum contaminant level goals and national primary drinking water regulations and, after opportunity for public comment, simultaneously publish maximum contaminant level goals and promulgate national primary drinking water regulations for the fourteen contaminants listed in the Advance Notice of Proposed Rulemaking published in volume 47, Federal Register, page 9352; or

"(ii) make and publish a determination in the Federal Register that for a particular contaminant listed in volume 47, Federal Register, page 9352, a national primary drinking water regulation is not necessary because the levels of such contaminant currently found in public water systems do not represent a threat of a known or anticipated adverse effect on the health of persons.

"(B) Not later than 36 months after the date of enactment of the Safe Drinking Water Act Amendments of 1984, the Administrator shall—

"(i) simultaneously propose maximum contaminant level goals and national primary drinking water regulations and, after opportunity for public comment, simultaneously publish maximum contaminant level goals and promulgate national drinking primary water regulations for each of the contaminants listed in the Advance Notice of Proposed Rulemaking published in volume 48, Federal Register, page 45502; or

"(ii) make and publish a determination in the Federal Register that for a particular contaminant listed in volume 48, Federal Register, page 45502, a national primary drinking water regulation is not necessary because the levels of such contaminant currently found in public water systems do not represent a threat of a known or anticipated adverse effect on the health of persons.

"(C)(i) The Administrator shall publish maximum contaminant level goals and simultaneously promulgate national primary drinking water regulations for each substance (other than a substance referred to in subparagraphs (A) or (B) for which a national primary drinking water regulation was promulgated) which, in the judgment of the Administrator, may have an adverse effect on the health of persons. On January 1, 1988, and at annual intervals thereafter, the Administrator shall publish a list establishing priorities for the review of substances (other than substances referred to in subparagraph (A) or (B)) which may require regulation under this Act in order to prevent known or anticipated adverse effects on the health of persons. Such priorities shall be based upon the extent to which such contaminant occurs in public water systems throughout the United States and on the known or anticipated adverse effects of such substance on the health of persons. In establishing such priorities the Administrator's consideration shall include, but not be limited to, substances regulated as toxic water pollutants under section 307 of the Clean Water Act and substances registered as pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act.

"(ii) For each contaminant listed on the priority list, the Administrator shall, within three years of listing, simultaneously publish a maximum contaminant level goal and promulgate a national primary drinking water regulation or make and publish a determination in the Federal Register for such contaminant that a national primary drinking water regulation is not necessary because the levels of such contaminant found in public water systems do not represent a threat of a known or anticipated adverse effect on the health of persons.

"(2) Each maximum contaminant level goal established under this subsection shall be set at the level at which, in the Administrator's judgment, no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety. Each national primary drinking water regulation for a contaminant for which a maximum contaminant level goal is established under this subsection shall specify a maximum level for such contaminant which is as close to the maximum contaminant level goal as is feasible.

"(3)(A) The Administrator is authorized to promulgate a national primary drinking water regulation that requires the use of a treatment technique in lieu of establishing a maximum contaminant level, if the Administrator makes a finding of overriding economic and technological constraints on monitoring. In such case, the Administrator shall identify those treatment techniques which, in the Administrator's judgment, would prevent known or anticipated adverse effects on the health of persons to the extent feasible. Such regulations shall specify each treatment technique known to the Administrator which meets the requirements of this paragraph, but the Administrator may grant a variance from any such specified treatment technique in accordance with section 1415(a)(3).

"(B) If any contaminant referred to in paragraphs (b)(1) (A) or (B) is listed under this paragraph (and a national primary drinking water regulation requiring the use of treatment techniques is simultaneously promulgated under this paragraph for such contaminant), the listing and promulgation under this paragraph shall be made on the date referred to in paragraphs (b)(1) (A) and (B) for the establishment of primary drinking water regulations.

"(C) The Administrator shall propose and promulgate regulations requiring filtration as a treatment technique for all public water systems supplied by surface raw water sources. The Administrator is authorized to grant variances from this requirement according to the provisions under sections 1415(a)(1)(B) and 1415(a)(3).

"(D) The Administrator shall propose and promulgate regulations requiring disinfection as a treatment technique for all public water systems. The Administrator is authorized to grant variances from this requirement according to the provisions under sections 1415(a)(1)(B) and 1415(a)(3).

"(4) The Administrator may, after opportunity for public comment, change maximum contaminant level goals, or the list established under paragraph (3), and shall simultaneously with such change, amend the national primary drinking water regulations concerned accordingly.

"(5) For the purpose of this subsection, the term 'feasible' means feasible with the use of technology, treatment techniques, or other means, which the Administrator determines to be the best available.".

(c) Sections 1412(b) (4), (5), and (6) of the Safe Drinking Water Act are amended by striking the word "Revised" where it appears and redesignating the paragraphs "(6)", "(7)", and "(8)".

(d) Section 1412(e) of the Safe Drinking Water Act is amended to read as follows:

"(e) The Administrator shall provide the Science Advisory Board, established under the Environmental Research, Development, and Demonstration Act of 1978, an opportunity to comment prior to proposal of a maximum contaminant level goal and national primary drinking water regulation.".

ENFORCEMENT

SEC. 4. (a) Section 1414(a)(1)(A) of the Safe Drinking Water Act is amended by inserting "and such public water system" after the words "notify the State".

(b) Section 1414(a)(1)(B) of the Safe Drinking Water Act is amended to read as follows:

"(B) If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order under subsection (g) requiring the public water system to comply with such regulation or requirement or shall commence a civil action under subsection (b).".

(c) Section 1414(a)(2) of the Safe Drinking Water Act is amended by striking the words "he may commence a civil action under subsection (b)" and adding the following: "he shall issue an order under subsection (g) requiring the public water system to comply with such regulation or requirement or shall commence a civil action under subsection (b)".

(d) Section 1414 of the Safe Drinking Water Act is amended by adding at the end thereof the following new subsection (g):

"(g)(1) In any case in which the Administrator is authorized to bring a civil action under this section with respect to any regulation, schedule, or other requirement, the Administrator also may issue an order to require compliance with such regulation, schedule, or other requirement.

"(2) An order issued under this subsection shall not take effect until after notice and opportunity for public hearing and, in the case of a State having primary enforcement responsibility, until after the Administrator has provided the State with an opportunity to confer with the Administrator regarding the proposed order. A copy of any order proposed to be issued under this subsection shall be sent to the appropriate State agency of the State involved if the State has primary enforcement responsibility for public water systems in that State. Any order issued under this subsection shall state with reasonable specificity the nature of the violation. In any case in which an order under this subsection is issued to a corporation, a copy of such order shall be issued to appropriate corporate officers.

"(3)(A) Any person who violates, or fails or refuses to comply with, an order under paragraph (2) shall be liable to the United States for a civil penalty of not more than $25,000 per day of violation.

"(B) In the case of any civil penalty under this paragraph which does not exceed a total of $5,000, the penalty shall be assessed by the Administrator after notice and opportunity for a hearing on the record in accordance with section 554 of title 5 of the United States Code. The Administrator shall have the discretion to compromise, modify, or remit, with or without conditions, any civil penalty assessed under this subsection against any person.

"(C) In the case of any civil penalty which exceeds $5,000, the penalty shall be assessed by a civil action brought by the Administrator in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code).

"(D) If any person fails to pay an assessment of a civil penalty after it has become a final and unappealable order, or after the appropriate court of appeals has entered final judgment in favor of the Administrator, the Attorney General shall recover the amount for which such person is liable in any appropriate district court of the United States. In any such action, the validity and appropriateness of the final order imposing the civil penalty shall not be subject to review.".

(e) Section 1414 of the Safe Drinking Water Act is amended by striking the words "FAILURE BY STATE TO ASSURE" from the title.

PUBLIC NOTIFICATION

SEC. 5. (a) Section 1414(c) of the Safe Drinking Water Act is amended by striking everything after the sentence "The Administrator shall by regulation prescribe the form, manner, and frequency for giving notice under this subsection" to the sentence beginning "The Administrator may also require" and adding the following: "within 12 months after the date of the enactment of the Safe Drinking Water Act Amendments of 1984, the Administrator shall amend such regulations to provide for different types and frequencies of notice based on the differences between violations which are intermittent or infrequent and violations which are continuous or frequent. Such regulations shall also take into account the seriousness of any potential adverse health effects which may be involved. Notice for violations designated by the Administrator as continuous or posing a serious potential adverse health effect shall be given no less frequently than every three months and in no case shall notices be given less frequently than annually. Until such amendments are promulgated, the regulations in effect on the date of the enactment of the Safe Drinking Water Act Amendments of 1984 shall remain in effect.".

VARIANCES

SEC. 6. (a) Section 1415(a)(1)(A) of the Safe Drinking Water Act is amended by striking the word "despite" and adding the following: ". A variance may only be issued to a system after the system's.".

(b) Section 1415(a)(1)(A) of the Safe Drinking Water Act is amended by striking the word "generally" before the word "available" and by adding after "(taking costs into consideration.)" the following: "The Administrator shall propose and promulgate his finding of the best available technology, treatment techniques or other means available for each containment at the time he proposes and promulgates a maximum contaminant level for each such contaminant. The Administrator's finding of best available technology, treatment techniques or other means may vary depending on the number of persons served by the system or for other physical conditions related to engineering feasibility and costs of compliance with maximum contaminant levels as considered appropriate by the Administrator.".

(c) Section 1415(a)(1)(A) of the Safe Drinking Water Act is amended by striking the words "within one year of the date" and adding "at the time".

(d) Section 1415(a)(1)(A)(ii) of the Safe Drinking Water Act is amended by adding after the words "water system of such" the word "additional".

EXEMPTIONS

SEC. 7. (a) Section 1416(b)(1) of the Safe Drinking Water Act is amended by striking the words "within one year of the date" and adding "at the time".

(b) Section 1416(b)(2)(A)(i) of the Safe Drinking Water Act is amended by striking the word "interim" and striking the words "not later than January 1, 1984" and adding "not later than twelve months after the date of the enactment of the Safe Drinking Water Act Amendments of 1984".

(c) Section 1416(b)(2)(A)(ii) of the Safe Drinking Water Act is amended by striking the word "revised" and the words "not later than seven years after the date such requirement takes effect" and adding "other than a regulation referred to in section 1412(a), 12 months after the date of the issuance of the exemption".

(d) Section 1416(a)(2)(B) is amended to read as follows:

"(B) The final date for compliance provided in any schedule in the case of any exemption may be extended by the State (in the case of a State which has primary enforcement responsibility) or by the Administrator (in any other case) for a period not to exceed three years after the date of the issuance of the exemption if the public water system establishes that—

"(i) the system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

"(ii) the system is taking all practicable steps to meet the standard;

"(iii) in the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance; or

"(iv) the system has entered into an enforceable agreement to become a part of a regional public water system.

In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under subsection (b)(2)(A) (i) or (ii) may be renewed for one or more additional 2-year periods if the system establishes that it continues to meet the requirements of clause (ii) of this subparagraph.

ENFORCEMENT

SEC. 8. (a) Section 1423(a)(1) of the Safe Drinking Water Act is amended by striking out all after the first sentence and substituting the following: "If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order under subsection (d) requiring the person to comply with such requirement or shall commence a civil action under subsection (b)(1).".

(b) Section 1414(a)(2) of the Safe Drinking Water Act is amended by striking the words "he may commence a civil action under subsection (b)(1)" and substituting the following: "he shall issue an order under subsection (d) requiring the person to comply with such requirement or shall commence a civil action under subsection (b)(1)".

(c) Section 1423(b)(1) of the Safe Drinking Water Act is amended by striking out the first sentence thereof and substituting the following: "Civil actions referred to in paragraphs (1) and (2), subsection (a) shall be brought in the appropriate

United States district court and such court shall have jurisdiction to require compliance with any requirement of an applicable underground injection program.".

(d) Section 1423(b)(1) of the Safe Drinking Water Act is amended by striking in the last sentence "$5,000" and substituting "$25,000" and by striking "60" and substituting "30".

(e) Section 1423 of the Safe Drinking Water Act is amended by adding the following new subsection at the end thereof:

"(d)(1) In any case in which the Administrator is authorized to bring a civil action under this section with respect to any requirement of an applicable underground injection control program, the Administrator may also issue an order to require compliance with such requirement.

"(2) An order issued under this subsection shall not take effect until after notice and opportunity for public hearing and, in the case of a State having primary enforcement responsibility for underground water sources (within the meaning of section 1422(b)(3) or 1425(c)) until after the Administrator has provided the State with an opportunity to confer with the Administrator regarding the proposed order. A copy of any order proposed to be issued under this subsection shall be sent to the appropriate State agency involved if the State has primary enforcement responsibility. Any order issued under this subsection shall state with reasonable specificity the nature of the violation. In any case in which an order under this subsection is issued to a corporation, a copy of such order shall be issued to appropriate corporate officers.

"(3)(A) Any person who violates, or fails or refuses to comply with an order under paragraph (2) shall be liable to the United States for a civil penalty of not more than $25,000 per day of violation.

"(B) In the case of any civil penalty under this paragraph which does not exceed $5,000, the penalty shall be assessed by the Administrator after notice and opportunity for a hearing on the record in accordance with section 554 of title 5 of the United States Code. The Administrator shall have the discretion to compromise, modify, or remit, with or without conditions, any civil penalty assessed under this subsection against any person.

"(C) In the case of any civil penalty which exceeds $5,000, the penalty shall be assessed by a civil action brought by the Administrator in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code).

"(D) If any person fails to pay an assessment of a civil penalty after it has become a final and unappealable order, or after the appropriate court of appeals has entered final judgment in favor of the Administrator, the Attorney General shall recover the amount for which such person is liable in any appropriate district court of the United States. In any such action, the validity and appropriateness of the final order imposing the civil penalty shall not be subject to review.".

(f) Section 1423 of the Safe Drinking Water Act is amended by striking the words "FAILURE OF STATE TO ASSURE" from the title.

RESTRICTIONS ON UNDERGROUND INJECTION OF HAZARDOUS WASTE AND REGULATION OF STATE PROGRAMS

Sec. 9. (a) Part C of the Safe Drinking Water Act is amended by adding the following new sections:

"RESTRICTIONS ON HAZARDOUS WASTE INJECTION

"Sec. 1426. No hazardous waste may be disposed of by underground injection above or into a formation which contains (within one-quarter mile of the injection well bore) a drinking water source. Injection of contaminated ground water into the aquifer from which it was withdrawn may be allowed if the Administrator determines, pursuant to procedures approved under this Act or the Resource Conservation and Recovery Act or the Comprehensive Environmental Response, Compensation and Liability Act, that such injection is an appropriate and environmentally acceptable aspect of a cleanup, removal or remedial action for the contaminated aquifer. The prohibition established under this subsection shall take effect six months after the enactment of this section except in the case of any State in which identical prohibitions are in effect before such date. The term "hazardous waste" used in this section means any hazardous waste, as defined in the Solid Waste Disposal Act, which is listed or identified under section 3001 of that Act. The prohibition established by this subsection shall be treated for purposes of this Act as a prohibition established pursuant to an applicable underground injection program.

"REGULATION OF STATE PROGRAMS

"SEC. 1427. (a) No later than 18 months after enactment, the Administrator shall revise regulations issued under this Act to require the following:

"(1) restoration of ground water quality after the termination of class III operations such that underground drinking water sources in the prescribed location will exceed national primary drinking water regulation or any other unregulated contamination which the Administration determines may pose adverse health effects to persons.

"(2) monitoring of underground drinking water sources down gradient from a class I injection well.

"(b) Section 146.4(c) of title 40 of the Code of Federal Regulations, as in effect as of the date of enactment, shall not apply after such date.

"(c) The Administrator, in cooperation with the State, shall compile and, not later than 3 months after the date of enactment of these amendments, submit to the Committee on the Environment and Public Works of the United States Senate and the Committee on Energy and Commerce of the United States House of Representatives, an inventory of all wells in the United States which inject hazardous wastes. The inventory shall include the following information:

"(1) the location and depth of each well;

"(2) engineering and construction details of each, including the thickness and composition of its casing, the width and content of the annulus, and pump pressure and capacity;

"(3) the hydrogeological characteristics of the overlying and underlying strata, as well as that into which the waste is injected;

"(4) the location and size of all drinking water aquifers penetrated by the well, or within a one-mile radius of the well or within two hundred feet below the well injection point;

"(5) the location, capacity, and population served by each well providing drinking or irrigation water which is within a five-mile radius of the injection well;

"(6) the nature and volume of the waste injected during the one-year period immediately preceding the date of the report;

"(7) the dates and nature of the inspections of the injection well conducted by independent third parties or agents of State, Federal or local governments;

"(8) the name and address of all owners and operators of the well and any disposal facility associated with it; and

"(9) such other information as the Administrator may, in his discretion, deem necessary to define the scope and nature of hazardous waste disposal in the United States through underground injection.

"(b) In fulfilling the requirements of subsection (a)(3)–(5), the Administrator need only submit such information as can be obtained from currently existing State records and from site visits to at least twenty facilities containing wells which inject hazardous waste.

"(c) The States shall make available to the Administrator such information as he deems necessary to accomplish the objections of this section.".

TAMPERING WITH PUBLIC WATER SYSTEMS

SEC. 10. Part D is amended by adding the following new section at the end thereof;

"TAMPERING WITH PUBLIC WATER SYSTEMS

"SEC. 1432. (a) Any person who tampers with a public water system shall be fined not more than $50,000, or imprisoned for not more than 5 years, or both.

"(b) Any person who attempts to tamper, or makes a threat to tamper, with a public drinking water system be fined not more than $20,000, or imprisoned for not more than 3 years, or both.

"(c) The Administrator may bring a civil action in the appropriate United States district court (as determined under the provisions of title 28 of the United States Code) against any person who tampers, attempts, to tamper, or makes a threat to tamper with a public water system. The court may impose on such person a civil penalty of not more than $50,000 for such tampering or not more than $20,000 for such attempt or threat.

"(d) For purposes of this section, the term 'tamper' means

"(1) to introduce a contaminant into a public water system with the intention of harming persons; or

"(2) to otherwise interfere with the operation of a public water system with the intention of harming persons.".

TECHNICAL ASSISTANCE

SEC. 11. (a) Section 1442 of the Safe Drinking Water Act is amended by adding the following new subsection:

"(g) The Administrator is authorized to provide technical assistance to small public water systems to enable such systems to achieve and maintain compliance with national drinking water regulations. Such assistance may include 'circuit-rider' programs, training, and preliminary engineering studies. There are authorized to be appropriated to carry out this subsection, $5,000,000 for each of the fiscal years 1984 through 1989.".

AUTHORIZATION OF APPROPRIATIONS

SEC. 12. (a) Section 1442(f) of the Safe Drinking Water Act is amended by inserting the following at the end thereof: "There are authorized to be appropriated to carry out subsection (a)(2)(B), $9,600,000 for the fiscal year 1984, $9,600,000 for the fiscal year 1985, $11,300,000 for the fiscal year 1986, $11,300,000 for the fiscal year 1987, $11,300,000 for the fiscal year 1988, and $11,300,000 for the fiscal year 1989. There are authorized to be appropriated to carry out the provisions of this section (other than subsection (g), subsection (a)(2)(B), and provisions relating to research), $42,000,000 for the fiscal year 1984, $42,000,000 for the fiscal year 1985, $47,000,000 for the fiscal year 1986, $47,000,000 for the fiscal year 1987, $47,000,000 for the fiscal year 1988, and $47,000,000 for the fiscal year 1989.".

(b) Section 1443(a)(7) of the Safe Drinking Water Act is amended by adding the following at the end thereof: "For the purposes of making grants under paragraph (1) there are authorized to be appropriated $40,000,000 for the fiscal year 1984, $40,000,000 for the fiscal year 1985, $45,000,000 for the fiscal year 1986, $45,000,000 for the fiscal year 1987, $45,000,000 for the fiscal year 1988, and $45,000,000 for the fiscal year 1989.".

(c) Section 1443(b)(5) of the Safe Drinking Water Act is amended by adding the following at the end thereof: "For the purpose of making grants under paragraph (1) there are authorized to be appropriated $25,000,000 for the fiscal year 1984, $25,000,000 for the fiscal year 1985, $28,000,000 for the fiscal year 1986, $28,000,000 for the fiscal year 1987, $28,000,000 for the fiscal year 1988, and $28,000,000 for the fiscal year 1989.".

(d) Section 1441(f) of the Safe Drinking Water Act is amended by striking out "in effect" and all that follows and substituting "in effect for more than one year.".

MONITORING FOR UNREGULATED CONTAMINANTS

SEC. 13. (a) Section 1445(a) of the Safe Drinking Water Act is amended by adding at the end thereof the following: "In requiring a public water system to monitor under this subsection, the Administrator may take into consideration the system size and the contaminants likely to be found in the system's drinking water.".

(b) Section 1445(a) of the Safe Drinking Water Act is amended by adding "(1)" after "(a)" and adding the following at the end thereof:

"(2) Not later than 18 months from the date of enactment, the Administrator shall promulgate regulations for every public water system to conduct a monitoring program for unregulated contaminants. The Administrator's regulations shall vary the frequency and schedule of monitoring requirements for systems based on the number of persons served by the system and the contaminants likely to be found but each system must be required to monitor surface sources and representative supply wells at least once and such monitoring must be conducted within five years of the effective date of the Administrator's regulations. The Administrator's regulations shall list unregulated contaminants for which systems may be required to monitor, but the primary enforcement authority in each State shall be given the flexibility to add or delete contaminants, for individual systems, based on an approved assessment of what contaminants may be found in the system. Notification of the availability of the results of such monitoring programs shall be given to the persons served by the system and the Administrator. The Administrator may waive this monitoring requirement for a system which has conducted a monitoring program after January 1, 1983, if the Administrator determines the program to have been consistent with the regulations promulgated under this section.

"(3) The Administrator shall reimburse the monitoring costs incurred under the regulation by systems supplying less than 150 service connections.".

SAFE DRINKING WATER ACT AMENDMENTS OF 1984

MONDAY, JUNE 11, 1984

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Toxic Substances
and Environmental Oversight,
Washington, DC.

The subcommittee met at 10 a.m. in room SD-406, Dirksen Senate Office Building, Hon. Dave Durenberger (chairman of the subcommittee) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator Durenberger. The hearing will come to order.

Welcome to the second hearing of the Subcommittee on Toxic Substances and Environmental Oversight on the subject of amendments to the public water system and underground injection control provisions of the Safe Drinking Water Act.

This act was intended to provide the basis for the protection of public health from contaminants in the Nation's drinking water. As we find these contaminants in our water supplies with increasing frequency, the importance of the regulatory objectives and procedures established by the act are heightened.

We have not achieved what Congress intended over the past 10 years since its enactment. Although Americans need not fear the waterborne horrors of the past, such as cholera and typhoid, there are new and uncertain risks posed by the ubiquitous contaminants of our industrial society.

Standards set by the Environmental Protection Agency for substances which pose a potential adverse health threat were to be the cornerstone of the public water supply program. The standards for those substances which are now of greatest concern to the American public—synthetic organics such as benzene, TCE, EDB, and many others—have not been set. Therefore, we do not have the appropriate tools to find and address existing drinking water problems.

I have introduced a bill of Safe Drinking Water Act amendments with the cosponsorship of Senators Humphrey and Baucus, which is aimed at expediting the standard-setting process and encouraging detection of unidentified contamination. At the previous subcommittee hearing, a number of witnesses, representing both large and small and public and private water system associations, environmental groups, and public health concerns, presented their views on S. 2649. I believe it is accurate to say that the general attitude was one of agreement that changes were necessary in the safe drinking water program and that the bill represented a positive step in this direction. The primary differences between witnesses were over technical definitions rather than regulatory philosophies.

I am encouraged by the fact that we are converging on common areas of agreement as to what needs to be done to make the public water supply program more effective and responsive to our emerging awareness of ground water contamination.

We did not have an opportunity to fully address the issue of underground injection of waste and the proposed amendments to the underground injection control program at the last hearing. We were to have had a panel of waste injection experts as part of the proceedings today but had to postpone that portion of the hearing because of last minute difficulties with witness schedules.

Today we will hear from Mr. Jack Ravan about the Environmental Protection Agency's assessment of the current status of the drinking water program and the proposed amendments. I look forward to hearing his testimony and appreciate the useful technical comments the EPA has provided during the development of the amendments. Let us continue to confer productively on this vital issue to make certain that this bill produces the changes needed to assure the American public that their health is safe from existing and potential contamination of drinking water.

Jack, welcome.

STATEMENT OF JACK RAVAN, ASSISTANT ADMINISTRATOR FOR WATER, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY VICTOR KIMM, DIRECTOR, OFFICE OF DRINKING WATER, ENVIRONMENTAL PROTECTION AGENCY

Mr. **Ravan**. Thank you, Mr. Chairman.

Senator Durenberger, I have with me today Mr. Victor Kimm who, as you know, is a longtime professional in the field and heads up our Office of Drinking Water. And I have come to know Vic on a more professional basis since I was last before your subcommittee and will rely upon him today for assistance in answering any questions that you may have at the conclusion of my remarks. Also with me today, Mr. Chairman, are members of the EPA staff who are seated in the audience and I have been assured that these staff members will only wince slightly if I should make a slip of the tongue.

Senator **Durenberger**. I am always delighted when an expert brings experts.

Mr. **Ravan**. Thank you, Mr. Chairman.

I really am appreciative of the fact that you and the subcommittee have had great patience with the Agency and myself in getting before you for this scheduled testimony after a couple of false starts. I am very happy indeed to be with you this morning.

Mr. Chairman, you have a copy of my statement, and it has been available to the staff, so I would like to summarize that statement, if I may.

Senator **Durenberger**. Without objection, your full statement will be made a part of the record.

Mr. **Ravan**. Thank you.

Let me begin, sir, by saying that I think the work that has been done on these amendments, both with our staff and your staff is exemplary and a great deal of progress has been made.

The Environmental Protection Agency, as I told you some 5 months ago, has made some significant progress in implementing the Safe Drinking Water Act. And I would like to point out one of these elements of progress. We have proposed recommended maximum contaminant levels for the first package of volatile organic chemicals, the so-called VOC's, or solvents. And while I testified before that this four step process is somewhat cumbersome, I am encouraged that we have at least made that beginning.

The other parts of the testimony that I would like to skip to quickly record our feelings with regard to the present bill that is before the subcommittee.

We welcome the proposal to change the standard-setting process. The three points that I would like to highlight are: The clarifying of the role of the NAS and providing opportunity for our own science advisory panel or board to review the standard-setting action.

I think our experience in the past indicates that this is a step in the right direction.

It would also allow for simultaneous proposal of recommended maximum contaminant levels and the enforceable standards, MCL's.

As I testified before, I think this four-step process of RMCL, MCL, is a bit cumbersome, especially since we have laid out some 16 steps to complete that action. I think the present language of the bill S. 2649 helps substantially.

We also agree with dropping the distinction between the interim and revised drinking water standards, which becomes meaningless once the current revision of the old standards takes place.

We support the change in the definition of what is considered feasible from "generally available" to "best available" technology. We believe it reinforces our position to encourage the use of effective technology not yet in common use.

We support the ban on shallow injection of hazardous wastes and have already promulgated regulations to that effect.

We are pleased to be given the ability to issue administrative orders and penalties and believe that amendments giving the Administrator added flexibility to tailor public notification of violations to the seriousness and frequency of the violation will ultimately enhance our enforcement capabilities.

Mr. Chairman, as you know, the Agency has some record of dealing with administrative orders and penalties and we believe this experience speaks well.

Finally, we support the provisions for exemptions for small systems which are economically unable to comply with a standard. However, we believe that they should be available for systems that serve fewer than 3,500 persons rather than the 500 service connections in S. 2649.

Let me turn to some of the reservations that we have, Senator Durenberger, with regard to S. 2649. Specifically:

We believe that costs should be taken into consideration in setting standards as long as they are determined by what a large, professionally managed technically competent system can do.

We believe that filtration and disinfection are appropriate treatment techniques and have published an ANPRM describing the possibility of filtration and disinfection regulations, with provisions for variances. However, we believe that statutory amendments in this area are unnecessary as existing authorities are adequate.

We support the concept of monitoring for unregulated contaminants, and believe that a structured program would be beneficial. We have the authority to require such monitoring and intend to use it, and we oppose the imposition of the mandatory monitoring schemes outlined by the bill. We also oppose reimbursement of small systems for their costs.

We believe that a mandated list of standards would overly restrict the Administrator's flexibility. Even though the list described in S. 2649 is tailored to drinking water concerns and tracks our ANPRM's, we believe that it is important for the Agency to be able to adjust priorities as new problems emerge and need attention.

We also would point out that the process after notification under the present system or that system which was anticipated, would in fact indicate that some of those would fall off and others would be added and this is what we mean by the flexibility.

We believe that selective enforcement in delegated States can be very productive, provided we have the discretion to choose the targets. However, requiring the Federal Government to commence enforcement action for every violation within 30 days is overly restrictive, not an effective use of resources and runs counter to the spirit of delegation.

We oppose a new Federal cause of action for tampering with public water supplies because there are now sufficient authorities to deal with the problem.

I testified on this before and our position remains the same. We feel that there are sufficient laws to allow the Federal agencies to become involved as they need to.

We agree that technical assistance is important to improve compliance among small systems, but we believe that the funds authorized in these amendments are unnecessary. These activities are adequately supported by existing sources of funding, some $29 million each year.

We oppose the total authorization of $121 million contained in S. 2649 since it is far above the President's request for all SDWA programs and grants.

Finally, we believe that the current UIC regulations are adequate with regard to groundwater monitoring at class I well sites, and aquifer clean-up in mining sites, and oppose statutory changes at this time.

Mr. Chairman, this concludes my summary. I will be happy to answer any questions.

Senator **Durenberger**. Jack, one of the last statements you made, which appears in your full statement, and I quote:

> We oppose the total authorization of $121 million contained in S. 2649 because it is $65 million (or 116%) above the President's $56 million budget request for all Safe Drinking Water Act programs and grants.

One part of me says that sounds like "OMB made me do it," but that is not the answer to my question. That isn't my question. My question is a little more serious than that.

Can you tell me to what degree your recommendations on other sections of the bill have been affected by that particular statement that OMB may or may not have made you do it? Can I take all the rest of it as your best judgment or when we get to issues like reimbursing the States and local communities and so forth, is all that affected by that one statement I just quoted or is it a policy judgment that they don't need the money or they don't need the help?

Mr. **Ravan**. Mr. Chairman, in money matters with regard to this bill or any others that I have had the pleasure of testifying before you, clearly the budget restriction emanates from the President's budget and we are all supportive of those numbers. And the one that I just gave you comes from that policy position.

When we comment more specifically, I am guided not only as a matter of my personal judgment but as a matter of policy for the Agency by what Mr. Ruckelshaus has testified to. I think it is not only true but eloquent. In a world of diminishing Federal resources, we could all use more. There is no question about that, but I think what we are asking for, generally speaking, in this program is what we can efficiently use at this point in time and what we believe fits best into that fairly restrictive environment that we are in.

Senator **Durenberger**. I am not sure that you quite answered the question. I would like you to say yes or no; are all of your recommendations contrary to the amendment that I propose based only on best policy judgment on EPA or are they in part imposed by the limitation of dollar?

Mr. **Ravan**. They are imposed by both, Senator.

Senator **Durenberger**. The good news today is that you have a rule coming out today or tomorrow for recommended maximum contaminant levels for nine volatile organic chemicals. I wonder if you would extend your remarks on the basis of that proposal? What is that we can expect to see in those MCL's?

Mr. **Ravan**. Senator, the list that will be published, hopefully today or tomorrow, in the Federal Register, contains a list of 11. As you point out, we consider nine of them carcinogens. This will be the first step of the four-step process: our proposed levels of RMCL's for those substances. There will now follow a public comment period at the end of which we would close and then propose the MCL's for the substances. That is a proposal. And it takes a certain amount of time to get that record closed. And when we go final, there is by law a period of 18 months until that MCL becomes effective.

Therefore, that is the basis for my remark earlier that in my own opinion this is a fairly meager step, but it is a first step of a journey that to me looks like 34 or 36 months before we would have an effective MCL on the street.

Senator **Durenberger**. I wonder if you could be a little more specific on the removal efficiency goals. In just glancing over them, staff here tends—maybe because we want to—to come to the conclusion that your proposed rule provides some support to the notion we have here that we should rely on best technological capability to rid our drinking water of potential harmful contaminants.

I wonder if you wouldn't take a little time to explore with us your own assessement of technological capability to get close to the recommended goal in cases where clean-up is necessary.

Mr. **Ravan**. Yes, I think so. Mr. Kimm has a comment he would like to make with regard to the technology.

We, only after what I would consider to be the most painful deliberations, set the RMCL's at zero, and that is the effect of our announcement either today or tomorrow. Thereafter, of course, we follow the requirements of the statute which says we should get the MCL as close thereto as possible so there would be no adverse health effects. And best technology, as provided by new legislation, we believe, would encourage that and be consistent not only with the work that already has been done but what we would hope would be accomplished in the future. And the definition, at least as we understand it, in the new language, would help us in that.

Senator **Durenberger**. Mr. Kimm, do you want to expand?

Mr. **Kimm**. Yes, sir; the technologies most likely to be used in those instances where there was serious ground water contamination is aeration or treatment with carbon absorbant. Both of these treatments are not in the content of the statue, they are not widely applied at the moment but they are available and effective. We believe we have amassed adequate data to convince the interested public that in fact these technologies do work. We will be looking at just how close to the goals it is possible to set the standards.

We have taken the position under the existing statute that the language on generally available technology did not necessarily mean that it had to be widely used. We believe that your language further clarifies that point which would be very relevant here because as we deal with new contaminants we will be looking at a variety of technologies that have not been applied because people have not perceived these as problems over the years and it will give us the ability to provide higher levels of public health protection.

Senator **Durenberger**. Very good.

Jack, in discussing with various State and local officials drinking water issues, we have been informed on the importance of health advisories for detected contaminants for which there are no standards. In cases of ground water contamination by pesticide infiltration, health advisory levels have been used to guide response actions.

In your testimony you mentioned a new internal agreement between the Offices of Drinking Water and Pesticide Programs to enhance the issuance of health advisories and standards.

I wonder if you would describe for us the nature and expected results of this cooperative effort and the major Pesticide Monitoring Program?

Mr. RAVAN. I now ask Mr. Kimm to help me with the actual detail of that agreement. What the Assistant Administrator Jack Moore and I found some several months ago was that indeed there could be better utilization of information available to the Pesticides Program and requirements under Safe Drinking Water Act, especially as we move toward the ground water strategy. The work that was done was principally at our level to overcome some information gaps that had been allowed to occur between the two program elements. Therefore, we signed this bridge into being that would ensure that our two programs have the best available information on which to operate.

Our staffs are indicating to me and to Assistant Administrator Moore that this has been a very good step thus far.

Mr. KIMM. There are two particular areas being dealt with. One is determining safe levels of advisories. Under the pesticide statute that is as a part of the registration process. A great deal of toxicological data is provided upfront and additional data can be collected later in this process. While working more closely together, we want to maximize useful toxicological data which is available. Where those circumstances that more needs to be assembled, we will employ those there are procedures which ultimately will have the manufacturers providing the data.

The second part of our joint effort is involves instances of pesticides which were registered years ago under the premise that they would not migrate in the environment and were not expected to be found in ground water. Unfortunately those earlier judgments were incorrect. What we are presently doing is jointly trying to look at a regimen under which we will go out and monitor for high volume pesticides in the areas in which they have been used in large quantities over time to provide us with the current data. We are jointly pulling together with the Pesticides Program and will be undertaking monitoring from public water supplies with State corporation to give us the current data which will be a prerequisite of future standard setting.

Senator DURENBERGER. Can you get more specific on the Pesticides Monitoring Program and tell us when you are going to start?

Mr. KIMM. That is about where we are. We have examined the standard list of active ingredients which we thought was about a dozen chemicals. It is now in something excess of 50. These are active ingredients, and there are lots of pesticides. It turns out to be a fairly complicated process. We will divide the nations into zones and within those zones we will pick a random sample of public water supplies, and with the States, we will collect samples and see what is in there. Obviously, we should be out looking for pesticides in those places where they will be highly used.

Senator DURENBERGER. If we were to come back and visit this program, when might we want to do that? Next fall? Next winter?

Mr. RAVAN. I would think sometime toward the end of the year we will be able to tell you more precisely what we are going to do, both in regards to pesticides monitoring and also in terms of a regime for the unregulated contaminants which we are now actively developing.

Senator DURENBERGER. Are you getting a fair amount of cooperation from the pesticide manufacturers and some of the food industry people that had their eyes open?

Mr. KIMM. I think there is awareness of potential problems at the moment that did not exist in years gone by and I expect we will continue to receive strong cooperation. At the moment it is a matter of getting the basic information together with which we can design sensable sampling programs.

Senator DURENBERGER. My sense of the people involved out there who are either manufacturing or using the end product is that they are cooperative or at least willing to be cooperative.

Mr. RAVAN. I think that is accurate, Mr. Chairman. I have witnessed, cooperation, just in the last 8 months, not necessarily from the manufacturers themselves since most of that one-on-one interphase contact is through Jack Moore with his pesticides program, however, that spills over very quickly into agency affairs with other departmental elements. I have witnessed, for the first time an openness and forthcoming, a willingness to talk about some problem areas that were regarded as, if you will, turf battles in the past but with the experience of EDB's of the world, most of us now agree that there is a common integrated problem. I think that is what you are seeing under the memorandum of understanding also.

Senator DURENBERGER. This is a two-part question on monitoring.

During the course of hearings and other meetings on the subject of groundwater contamination, leaking underground storage tanks, toxic substances control, and drinking water, I have been dismayed by the reports of accidental detection of contamination of surface and groundwater supplies which could pose a threat to human health. I am very concerned about what contamination has not yet been discovered by accident. Therefore, I believe the requirement that systems monitor for unregulated contaminants is one of the most important provisions of this bill.

You indicated in your statement that the Agency has begun the process of planning for a monitoring regulation. Can you estimate when we could expect to see such a regulation if you are in the planning stages now? When do you expect to provide the subcommittee with your detailed schedule and workplan?

The second part. You stated your opposition to the provision in the bill for reimbursement of monitoring costs for systems supplying less than 150 service connections. We anticipate that this would be a one time cost over the next 5 years. Funding would also allow a check on the quality of the data.

From the Agency's experience with systems of this size, do you expect that monitoring would be accomplished without financial assistance? Will the Agency's planned regulation address the financial and technical problems of the very small systems in monitoring for the presence of unregulated contaminants?

Mr. RAVAN. Let me take the latter portion of the question and get Mr. Kimm to give you a sketch of the schedule.

In a sense, Senator, I have difficulty with the testimony in this area because it is an obvious truth that smaller systems across the countryside are not well financed and they are somewhat dependent on a higher level of government, meaning some county programs or multicounty, State, Federal, et cetera.

And at the same time, our experience indicates that once a program like that begins, it is very difficult, if not impossible, to see an end to it. We would attempt to deal with this as we take public comment on the monitoring requirements.

Two things I believe I would testify to today. One, such a survey, at least a one-time monitoring, would be in order. Second, there would have to be some sort of financial assistance or technical assistance, perhaps from the State level or multicounty level of government so that at least a one-time snapshot could be taken of what is out there.

How to do that across the board needs to be investigated in somewhat more detail before we conclude that this is the opportunity for the Federal largess to buy such a monitoring report.

Senator **Durenberger**. You don't object to the notion that together we have to find some way, not only to make sure of doing it but particularly this is going to be ongoing, that the quality is uniform to the data we are trying to get. You are not sure that is a matter of sending some experts or having them use some State or local consulting experts or whether we just reimburse them. You are not fighting the notion that a lot of these little folks, these small systems, are going to need help. Your question is whether or not we ought to set up the system to reimburse them for their expenses.

Mr. **Ravan**. You are exactly on target there, Mr. Chairman. There is no question in my mind that the assistance is necessary. There is no question in my mind but that we need that data. My real concern is, in fact; quality. Who would do it, where would it be done, how would that data be handled, how would it get back to some sort of analytical capability?

Those are my more immediate concerns and I would hope to get some help from the public process in dealing with that.

Mr. **Kimm**. First of all, Senator, I might quibble with your premise that the detection of contamination that is now going on is accidental. Both the Agency and the States have been looking at the primary source of these kinds of contamination, Superfund sites, RCRA facilities, and that kind of thing. In fact, most of the current known serious problems have had a fairly early involvement from the State water supply agencies, State health departments and a fair amount of monitoring is going on from the States and the different States are attacking this problem in different fashion.

At this moment, I just learned a few days ago that the State of California is putting together a fairly precise regime in this area and I hope to meet with these officials later this week to work with them.

I note in your statute you had a role for States in that.

In view of the problems of the tremendous amount of monitoring that has to take place, the limited amount of capability out there and the need for fairly good quality control, because we are going to be concerned at very low levels for many of these chemicals, an effective State role is the key of making this have an effect.

In terms of precise schedules, we are now beginning to assemble that data. As I said earlier, I would expect that we will fulfill the commitment here by reporting back to the subcommittee in the fall once we have a program developed.

Small systems, serving fewer than 500 people, constitute almost 40,000 systems. If one were to ask what would a particular one-shot analysis cost, the answer was $500 to $1,000. That is a $20 to $40 million cost which would exceed or equal current levels of grants to States. It would be a significant amount of money. Even if you had the money, we probably do not have the analytical capability yet. It will come along, as the need is there to do that work.

What we need here is a skillfully tailored approach with a significant role for the States. I think our concern here is direct reimbursement, knowing it will raise all kinds of interesting questions about how one would evaluate what it costs to collect the sample and ship it somewhere. It will also inhibit EPA and the State's ability to keep the analysis done in a limited number of labs for whom we have every reason to expect that quality control would be adequate to make sure that the data is meaningful.

Perhaps the most disastrous thing that might occur under these circumstances is a lot of poor data being assembled. The States and the utilities are going to be rationing limited amounts of money to deal with these problems.

Mr. **Ravan**. Senator, we know that there is a fairly good system in place out there of communication through the rural water program. The second point that occurs to me is that the opportunity to monitor common sources rather than individual small wells serving 25, 50, 100 people. I think we could save some money and time. The third factor that concerns me is that we have got to address the question of where do we believe, based upon perhaps some trend data from Superfund, RCRA and other data, could we get the best payoff and have a better than fair chance of being able to report back to you as complete a picture as we can.

Time is involved in all of that, obviously. The biggest system is no problem, midsize no problem, but getting out into the smaller systems is a problem.

Senator **Durenberger**. This relates back to the first question I asked you regarding OMB which you answered to my satisfaction. From a policy standpoint we are in agreement as to the mechanics of how to do it, and I don't hear you saying there isn't a Federal role in helping to finance part of this, is it that you object to the flat out reimbursement that is in the amendment presented?

Mr. **Ravan**. Yes, sir, we are concerned whether we could in fact hold the line overtime on a one-time payment. Generally speaking, that has not been successful. There seems to be no ending of those flows of money.

The second thing is we are indeed giving assistance dollars already to States and if priorities were agreed upon, I think a substantial part of that could get us a snapshot of what is going on out there with monitoring.

Mr. **Kimm**. If I might add a footnote. There are 20 States that are currently under some kind of monitoring with existing programs, are beginning to do some monitoring. I would also like to point out that there are 2,200 systems that serve 10,000 or larger. What we are trying to do is get as much coverage as we can as quickly as we can. The details are going to have to be worked out. I don't think there is any disagreement as to the need or general approach at how to get at this task.

Senator **Durenberger**. Let me ask you some clarifying questions.

You stated the Agency's support for a statutory exemption for small systems serving fewer than 3,000 people. Are you suggesting an exemption from required filtration or a blanket exemption from compliance with drinking water standards?

Mr. **Kimm**. Neither. In essence, the exemption would allow for an opportunity for a system that was not confronting a serious health problem and did have a basic economic hardship or causes which are spelled out in the statute. It will be an ordinary review. If it would be noncompliance, they have to come in and show the opportunity to come into compliance and if there are ways of them coming into compliance, that is what they would be expected to do.

Senator **Durenberger**. Let me ask why are existing exemption provisions, which are frequently used by small systems insufficient?

Mr. **Kimm**. One of the problems with the existing statute is that the exemptions expired in January of 1984.

Senator **Durenberger**. Is that the only problem?

Mr. **Kimm**. It was set up at a time when all of our expectation was we were further along than we presently are. I think that the system incorporated in your bill is much more workable, but it doesn't make an out automatic for anybody. What it does is provide an opportunity to obtain legal status to the system that can come in and show there is truly no feasible way to come into compliance. And, it has the override that the inherent human exposure cannot pass an unreasonable risk to health.

Senator **Durenberger**. A related question about financial assistance. We were told at the last hearing by individuals managing State programs that the $5 million per year in the proposed bill was clearly inadequate. I remember that caused me to ask a fellow from Illinois to go back and estimate how much people in Illinois spend on wine, liquor, beer, and other forms of liquid. I don't know if we have had a response, and I don't know whether the Illinois problem is a problem of financial capacity or a problem of priorities, but is your position on this whole issue of providing additional technical assistance and so forth based on the OMB premise or do you really believe that if they took a little of their appetite for beverages, reduce that by an amount compensated in an equivalant fashion with taxes, that we can, at State levels, provide the finances that are necessary for all these services?

Mr. **Ravan**. Senator, I think rather than let Mr. Kimm handle the OMB part, he has to live with them daily, I will answer that. Clearly, again the financial restraint is with us. Once having said that, you immediately come to the truth, small systems are least able to bear financially the fairly significant cost, to find out what is fair, what other people exactly are receiving.

You immediately touch a nerve ending of my own, which I would like to address. We had the American Water Association conference, where we discussed the cost of clean pure drinking water. We have, in fact, for too much time enjoyed quite a boon, we have not typically in this country had to pay for the value received from potable drinking water for all Americans.

It does seem to me that if there is as much concern on the part of the American people as there seems to be in a case like EDB from a number of people, that is, the agricultural community, the manufacturing community, EPA and others, it would seem to me reasonable to ask folks to pay for a one-time looksee at what they are drinking and that would indeed be a good bargain and not necessarily a need for a Federal largess.

That assistance, that one-time payment can come from two or three different schemes. I believe we are in a period of time, that is, the threat of groundwater contamination, in which people would be willing to do that.

Senator **Durenberger**. How about existing technical assistance system, that is, the joint EPA, FHA program? Can you give us some idea how much money is currently being expended per system in that program?

Mr. **Ravan**. No, sir, I don't think I can per system. I can get something on that for you. I have watched with some interest that program over the last 2 or 3 years, both at the State level, as well as the Federal level. It has, as you know, the Federal assistance level of some $4 million a year now, two from Farmers Home Administration and two from ourselves. The viability and effectiveness of that program does vary from State to State. I think, in my own opinion, it has to do with the leadership, local leadership involved in that program. I think we are getting a good payback for that fairly small investment.

Senator **Durenberger**. Again, we are trying to deal with the Federal role, the local role and we like to have effective leadership in all 50 States. We know we don't have it and that doesn't mean we look to Uncle Sam to provide that leadership. If you have seen that experience from both ends, you can be helpful in trying to demonstrate how better we might handle this fund.

I take your testimony to be you are sensitive to the fact that you want the right kind of technical assistance going into these small systems but again you are just resistent of endorsing blank checks across the country and for fear that might not give you the right kind of technical help. Maybe you can help us try to solve that problem.

I have some questions on underground injection well monitoring. You stated in your testimony your belief that monitoring of underground sources of drinking water at class I sites may be appropriate at times but should not be required by statute.

You indicated that the authority already exists to impose such monitoring. However, I don't believe it is common practice to do so except in a State such as Florida where it is required by State statute.

I wonder, has this type of monitoring of underground sources of drinking water been required by the Agency for the approval of any wells in nonprimacy States?

Mr. **Kimm**. May 11 was the promulgation of the direct implementation program. That becomes effective on June 25 and shortly thereafter we will probably notice a couple of draft permits, but we have not issued any permits so we are just getting to that point in the program.

The concern with monitoring wells, Class I are generally very deep wells, constitute a very different kind of problem than you would expect with a landfill or a shallow well where monitoring in the nearby aquifer is relatively straightforward and a reasonable estimate of where flows will move can be made.

We will be permitting a deep injection well only if we are reasonably convinced there will be no migration of pollutants to fresh water. Our focus is on the well itself, continuous monitoring and the variety of technical requirements required to give you redundant barriers against migration and detect any shift of operation until the well is shut down and the problem can be resolved.

Senator DURENBERGER. Is it feasible to put that burden on the operator?

Mr. RAVAN. Yes, sir.

Senator DURENBERGER. Is that a reliable operation to place the burden from your experience?

Mr. RAVAN. The NPDES program says that probably is the way to go with fairly stringent sanctions should there be an opportunity for any untruthfulness or lack of reporting requirement?

Mr. KIMM. And it is subject to inspection, supervision, recordkeeping, and fairly stringent penalties.

Senator DURENBERGER. Is this one of those situations where an operator once found guilty would not be an operator very long?

Mr. KIMM. We would certainly hope so, sir. The level of inspection he received would increase dramatically. Again there are a limited number of such facilities. The vast majority of them are facilities associated with large petroleum chemical facilities where the mangement is concerned about liabilities and other factors. They are well staffed and those facilities are, for the most part, in our experience, more closely controlled for economic and other reasons.

Where we will be putting our priority initially is on offsite disposal wells and there stringent supervision is going to be necessary.

Senator DURENBERGER. Many different chemicals are added directly to our drinking water during the treatment process or indirectly from pipes and storage tank linings. Knowledge about the safety of these chemicals is essential or we are defeating our own safe drinking water program. However, the Agency has not had the authority or the resources to maintain a rigorous additives review process.

On May 17, the Agency published its proposal for the development of a private sector voluntary standard organization for drinking water additives review.

Describe the nature of this organization, the advantages, if any, to a private sector initiative rather than an in-house program, and what will be the extent of the Agency's prospective role in this effort?

Mr. RAVAN. Senator, it is a very important task and that is one of the ways we feel in today's world to get the work accomplished. There are a number of these substances.

First of all, it is becoming more complex chemically speaking and the necessity for payback for that kind of information indicated to us, as we went through the options available, that that was in fact the way to go based upon the need for this information.

The involvement of the so-called private sector, and it is not exactly that, we are building in some safeguards in that system so that we get as much equity and honesty in the system as possible, but the primary objective is to identify for the industry, the user, and EPA that vital information. It would tend to indicate to those persons who need these additives what is available, what is safe, what the effects are, and so forth. So, with those kinds of paybacks, I think the system is going to work. We were concerned primarily that such a system was in place.

Mr. KIMM. The May 17 Federal Register notice, if you will, is solicitation, both a solicitation for comments on the proposal and for competitive proposal. We have had a dozen or so institutions, not private institutions, express some interest in this, so we will be waiting to see the material that we receive back. We had envisioned from the beginning an active EPA oversight role in this process and we would also retain from the beginning the ability to set standards for anything out there that we determine was a potential health problem and we could, through the standard-setting process, reach into a universe of hundreds of things looked at if we felt anything was inappropriately expressed.

There are really two parts to this problem, the bulk chemicals used in treatment and we have funded through the National Academy of Science something called the CODEX, which are really consensus under the auspices of the National Academy for quality control requirements for the chemicals used in the water supply treatment. The first generation of bulk chemicals seemed to be picked up by the utilities. If you want to sell them lime they ask you to give the CODEX or not which gives us a level of control which we didn't have previously.

Again, it was our expectation here to see what the outside world would bring to us in terms of new ideas and approaches. We have included in that request a number of specific questions: How would the public know what is going on, how would they handle confidential data which gets to be sticky items in these kinds of circumstances? So, we are awaiting response. If we could, we would like to develop a third party system and we would maintain EPA involvement to ensure that public health was adequately protected.

Senator DURENBERGER. Thank you, gentlemen, for your printed testimony and your response to the questions.

The hearing is adjourned.

[Whereupon, at 10:55 a.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.]

[Mr. Ravan's written statement with attachments follows:]

STATEMENT OF
JACK RAVAN
ASSISTANT ADMINISTRATOR FOR WATER
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT
UNITED STATES SENATE

June 11, 1984

Good morning, Mr. Chairman and Members of the Subcommittee. I am Jack Ravan, Assistant Administrator for Water of the U.S. EPA. Victor Kimm, the Director of our Office of Drinking Water, is with me this morning. We are pleased to have this opportunity to report to you on the implementation of the Safe Drinking Water Act and to discuss the way your proposed amendments would affect our programs.

EPA views the Safe Drinking Water Act as an essential element in the national effort to protect public health. It is basically a sound and workable law, but our experience has shown the need for some adjustments. Of the amendments you have proposed many appear to us to be useful changes and additions, while there are some we cannot support.

SDWA IMPLEMENTATION — Public Water Supply Program

Mr. Chairman, I will take just a few minutes to summarize the implementation of the SDWA and some of our recent successes, beginning with the Public Water Supply program.

The Public Water Supply program is an example of a strong Federal/State partnership. Of the 57 States and territories covered by the program, 52 have assumed primary enforcement responsibility, or primacy, and only 5 programs are administered by EPA's regional offices. Several other States, including Pennsylvania and Indiana, are actively working toward delegated status. Pennsylvania's legislature recently passed a bill that should lead to primacy.

EPA continues to set national standards for drinking water quality. Maximum contaminant levels (MCLs) have been published for microbiological contaminants, turbidity, ten inorganic chemicals, six pesticides, and radionuclides. In addition, EPA promulgated a standard for a category of chemicals called trihalomethanes, which includes chloroform, the suspected carcinogen most frequently found in drinking water. Trihalomethanes are by-products of chlorine used widely to disinfect surface supplies of drinking water. Fortunately, there are treatment practices which reduce THM contamination and also ensure adequate disinfection. Disinfection is a clearly beneficial practice by which our utilities have all but eliminated the classic water-borne diseases such as cholera and typhoid in the United States, although outbreaks of Giardia and other acute diseases continue to occur. In each of the last 10 years, more than 20 outbreaks of acute water-borne diseases have been reported, showing a continued need for monitoring and surveillance by competent agencies.

Monitoring and reporting for sodium and identification and correction of corrosion are also required. In addition, secondary regulations have been promulgated for 12 substances that affect the aesthetic quality of drinking water.

It is possible to see, over time, how the number of water systems has grown and compliance has increased. Attached is the FY83 Status Report on the program which presents summary information on the regulated community and detailed compliance information for the last three years. (Attachment 1). At the time of the passage of the Act in 1974, the regulated community was estimated to be approximately 19,000 systems. The information available from FY83 indicates that there are 59,000 community water systems. Looking at the current inventory, it is clear that most of the people in the United States are served by a very small number of large systems. More precisely, 0.5% of the systems serve more than 100,000 customers each. These very large systems account for 44% of the total population. However, the vast majority of the systems serve very small communities: 37,800 systems, or 64% of the total, serve 500 or fewer users. These systems provide drinking water for only 2.6% of the population served by community water systems.

Compliance with the drinking water standards has improved over the years. In 1970, a study performed by the U.S. Public Health Service indicated that only about 10% of the systems were monitoring adequately and meeting the microbiological standard. In 1981 and 1982, the General Accounting Office (GAO) reviewed the implementation of the drinking water program. The report noted that there were 146,000 violations of the National Interim Primary Drinking Water Regulations (NIPDWR) reported during FY80. Biological contaminants (which include coliform and turbidity) are the most frequently monitored contaminants. In the period from FY80 to FY83, compliance with the microbiological monitoring requirements improved from 69.9% to 76.6% in community water systems. In FY80, 16.5% of the systems persistently failed to monitor; that is, they did not monitor for four or more months during the year. In FY83, only 6.8% of the systems were persistent violators of the monitoring requirements, showing a significant improvement in overall monitoring. The rate of microbiological MCL compliance improved from 89% in FY80 to 90% in FY83, although the rate of persistent violations increased slightly from 1.0% in FY80 to 1.4% in FY83.

Compliance with inorganic, organic, and radiological standards is assessed on a multi-year basis and generally continues to be excellent. Yearly changes in compliance are difficult to evaluate due to the staggered monitoring, but we can identify about 3,000 systems, representing 5 percent of all community systems, with MCL violations, mostly due to naturally occurring fluoride and radionuclides.

For the newest standard, trihalomethanes, compliance monitoring indicates that only about 3% of the systems serving more than 75,000 people violate the MCL. Many systems took early action to reduce exposure levels even before the standard became effective. The water supply industry should be commended for its initiative and responsibility in this regard.

Let me turn now to the development of drinking water standards for additional contaminants in response to our evolving understanding of the problems and techniques available to treat them.

I am pleased to be able to tell you that our proposed rule for nine volatile organic chemicals (VOCs) was signed by the Administrator and will appear in the Federal Register tomorrow. This rule proposes health goals (or recommended maximum contaminant levels, RMCLs) for trichloroethylene, tetrachloroethyene, carbon tetrachloride, 1,1,1-trichloroethane, vinyl chloride, 1,2-dichloroethane, benzene, 1,1-dichloroethylene, and p-dichlorobenzene. The next step in the regulatory process mandated by the SDWA is to propose the enforceable standards, the MCLs, which are to be set as close to the RMCLs as is feasible using generally available treatment technologies and considering cost.

These regulations build on some recent scientific developments. Until the mid 1970's, we did not have the analytical techniques to identify many organic contaminants at trace levels in drinking water. Since then we have developed methods for monitoring, testing, and removing the newly identified contaminants. In recent years, we have all become aware of the danger of ground-water contamination and the impact it could have on drinking water supplies. While our surveys indicate that the vast majority of ground-water supplies are not seriously contaminated, where serious contamination of ground water by organics is detected it is usually highly localized but the levels detected can be ten to one hundred times higher than those detected in surface waters. It appears that the VOCs are good surrogates for many other forms of pollution. About twenty States have begun investigating serious ground-water problems by monitoring for the VOCs in drinking water. In addition, ground-water contamination incidents are being detected by EPA and the States in their investigation of potential Superfund sites and as a result of monitoring around hazardous wastes facilities as required under RCRA. As problems are detected, EPA and the States are moving to protect the health of affected communities.

In Phase II of our regulatory process, an Advance Notice of Proposed Rulemaking for a long list of contaminants, including microbiological, organic, and inorganic pollutants, was published on October 5, 1983 (48 FR 45502). It includes a comprehensive reassessment of existing standards and requests comments on the possible regulation of many new contaminants. Certain pesticides are prominent candidates for inclusion because we have recently begun to find them in ground water in significant quantities. Proposed RMCLs for these Phase II contaminants are expected by the end of the year.

The protozoan Giardia is one of the contaminants addressed in our Phase II ANPRM. It causes more water-borne disease outbreaks in the United States than any other identified etiologic agent. Between 1972-82, there were 60 reported outbreaks involving 20,000 cases. Due in part to greater recognition and reporting the trend has been sharply upward. In 1982 alone, there were twelve outbreaks, about 60% of them in community water systems.

Several outbreaks have occurred in Pennsylvania in the last six months.

Techniques to detect Giardia in drinking water are relatively insensitive and difficult to apply at the utility level. EPA is trying to improve monitoring methods, determine the most appropriate filtration and disinfection procedures, and minimize Giardia passage into the distribution system. A well-managed water treatment facility using chemical treatment, filtration and disinfection will greatly reduce, if not eliminate, breakthrough of Giardia cysts. Since feasible monitoring methods are not now available, EPA is considering a proposal for filtration of public water systems using surface supplies for inclusion in the Phase II regulation package. A system for granting variances as provided by the SDWA will also be developed to exclude communities that can demonstrate the absence of contamination or effectiveness of alternative technology.

EPA and the States are beginning a survey of the inorganic and radioactive contamination of the nation's water supplies as the first step in Phase III. The information on the occurrence of radium and uranium will be used with health data to propose RMCLs in 1985. The Agency will also consider studies done by the Department of Energy, Department of Interior and other Federal agencies.

Finally, in Phase IV, we plan to review the 1979 THM standard and also consider whether standards are needed for other disinfection by-products or the disinfectants themselves. At that time, we will be able to assess the impact of the existing THM regulation and apply the results of ongoing research on the chemistry and toxicology of all disinfection-related contamination.

In addition to developing regulations, EPA continues to provide technical assistance through a Health Advisory program. Health Advisories are written as needed for unregulated chemicals and used by States and communities when responding to contamination incidents and spills. While not legally enforceable, Health Advisories play an important role in protecting public health. A new internal agreement between the Office of Pesticide Programs and the Office of Drinking Water will allow expanded and more efficient cooperation between the two offices in the development of standards and Health Advisories for pesticides in water. In addition, ODW and OPP are jointly developing a major monitoring program for pesticides in water which will add much to our knowledge of the location and potential for migration of pesticides into ground and surface waters.

SDWA IMPLEMENTATION--Underground Injection Control Program

After a lengthy regulatory development process and subsequent litigation, the UIC program has made great strides (Attachment 2). We have now approved State-administered UIC programs in 30 States. Twenty-two of these States have programs approved for all classes of wells, six cover oil and gas wells only, and two cover other classes.

At the same time, we have developed state-specific Federal programs for the remaining States. These programs were developed in two sets. Regulations covering 22 jurisdictions were promulgated on May 11, 1984. Proposed regulations for the the remaining 13 jurisdictions were also published in the *Federal Register* on May 11.

When these proposed regulations are promulgated, by October of this year, effective UIC programs, run either by the States or by EPA, will be in place in every jurisdiction. In delegating authority to the States, we concentrated our efforts on working with the States in which most of the wells are located. As a result, we project that 73% of the deep disposal wells (Class I), 92% of the oil and gas related wells (Class II) and 97% of the mining wells (Class III) will be regulated by States at the end of this fiscal year.

Comment on S. 2649

With this brief description as background, I will now discuss the ways that the proposed amendments would affect our programs. Last October, the Administrator sent a letter to Congressman Waxman setting out the Administration's position on H.R. 3200. That letter continues to embody the basic Administration position, although this Senate bill contains some issues not raised in the House version and consequently not discussed in our letter.

EPA has long sought a streamlining of the awkward procedure for promulgating drinking water standards. Three of the proposed amendments would help to accomplish this. First, the bill eliminates the requirement that the National Academy of Sciences propose the recommended maximum contaminant levels. Second, it allows the simultaneous proposal and then promulgation of recommended maximum contaminant levels (or maximum contaminant level goals as they are called in the new bill) and the enforceable national drinking water standards. Third, the bill removes the distinction between interim and final standards. EPA supports all of these proposals. Although objective scientific opinion on drinking water regulations is useful, having the NAS set regulatory goals is not the appropriate way to obtain it. The bill recognizes this, and substitutes an opportunity for EPA's Science Advisory Board to review regulations. The simultaneous proposal and promulgation of goals and regulations should speed up the process and make public comment more meaningful because the goals, the standards and their relationship can be discussed simultaneously. Finally, there is no reason to perpetuate the distinction between the interim standards, promulgated just after the SDWA was passed, and standards promulgated since then.

In the criteria for setting drinking water standards, we support the change in the definition but we have serious reservations about deleting the direction to take cost into account when determining feasibility. In the past, some have interpreted the current "generally available" language to mean that EPA could base standards only on treatment that is in widespread use in the United States. The change to "best available" will ratify EPA's past interpretation and make clear the Congressional intent to encourage the use of effective technology which is available, even if not yet in common use. We think considering cost is good public policy so long as the cost considerations are determined by what a large, professionally managed, technically competent system could do. As is required under the current statute, we do not allow cost considerations in small systems to determine feasibility for setting standards for all systems.

EPA sees merit in requirements for all public water systems to disinfect and those drawing water from surface supplies to filter, but we believe that statutory amendments in this area are unnecessary. We are proud of the progress made by the American water industry in reducing water-borne disease, however, we believe that the problem should not exist at all in the United States in 1984. Filtration has been part of "conventional treatment" for 50 years. Although it is more expensive than disinfection alone, it is practiced by most medium and large systems using surface water, with a few notable exceptions. The increased occurrence of Giardia and the need to provide added protection against other types of bacteriological contaminants that can be controlled by filtration and disinfection indicate that it is an idea whose time is past due. It was supported by nearly all representatives of the water utilities on your first day of hearings. We have already published an ANPRM describing the possibility of filtration and disinfection regulations, with provisions for variances. Based upon generally favorable response, we are planning regulatory action along these lines under existing legislative authorities. This action will provide an opportunity for full public comments on the specifics.

EPA also supports a statutory exemption for small systems which are economically unable to comply with drinking water standards, provided there is no unreasonable risk to health. We continue to believe that a small system, for this purpose, should be defined as one serving fewer than 3,500 people. This is the size at which a system can support a full-time manager and generally charges for water, the two conditions that indicate the minimum technical and financial resources to undertake sophisticated treatment.

The enhanced enforcement powers in this bill remedy a deficiency of the SDWA. EPA would prefer to have the ability to issue administrative orders and penalties, rather than being forced to resort to relatively resource intensive court action. This will be particularly useful in enhancing compliance with monitoring requirements among small systems. EPA believes that the the amendments tailoring the public notification of violations to the seriousness and frequency of the violation may also enhance enforcement. The public's attention should not be diverted by a stream of unimportant notices, but rather focused on those which identify problems with their water supply systems. We also support the addition of administrative orders and fines for enforcing the Underground Injection

Control program.

The ban on injecting hazardous wastes into or above an aquifer containing a drinking water source is a case of the law catching up with our regulations. Our UIC regulations, published May 11, contain this very prohibition. We were pleased to see the ban tempered by an exception for the reinjection of contaminated ground water into the formation from which it came as part of an approved RCRA or CERCLA cleanup. It is important that the UIC program enhance rather than hamper the important work being done under RCRA and CERCLA.

EPA supports the concept of monitoring for unregulated contaminants. Although EPA and some States have already begun such monitoring, we agree that a more comprehensive and structured program would be beneficial. We clearly have the authority to require monitoring for unregulated contaminants under section 1445(a) of the SDWA and intend to exercise this authority. However, because we already have this authority and intend to use it, we oppose the imposition of the mandatory monitoring schemes outlined by the bill.

Whether in response to a new statutory mandate or the existing statutory authority, monitoring on a national scale will require a great deal of planning. Monitoring and subsequent testing are expensive. It is difficult to produce reliable and comparable test results in the different laboratories. In addition, we do not believe that there are enough laboratories and qualified technicians in the country to complete the number of analyses called for by the bill. Because some States have already started work on their own, we need to coordinate with them. We have already begun the process of planning for a regulation requiring monitoring for unregulated contaminants and will report back to the Subcommittee with our workplan and schedule when it is completed.

Finally, we agree that the public should be notified of the results of any such tests but we also believe that it is essential that the Agency provide information on their significance. We oppose reimbursement of all the small systems for their costs.

The bill also specifies regulation of contaminants listed in EPA's Advance Notices of Proposed Rulemaking (ANPRMs). The lists described in S. 2649 are tailored to drinking water concerns, track our ANPRMs, and allow EPA considerable discretion in deciding what should be regulated. Nevertheless, as we have said in connection with similar proposed lists in other environmental statutes, we do not think that mandated lists should be used to force regulatory development. They impose unwarranted rigidity and reduce our ability to adjust priorities within the Agency in response to new and emerging problems.

We are enthusiastic about the proposed new enforcement powers and believe that selective use of these powers within delegated states is a powerful tool, but we oppose their mandatory use. There were about 64,000 violations nationwide last year. Even if EPA's enforcement office had the additional funds necessary to issue that many administrative orders and civil actions, it would be a waste of resources. Selective Federal enforcement in delegated States can be very productive, provided we have the discretion to choose the targets.

One other problem bears mentioning. The States have primary enforcement responsibility for most of the public water supply programs and the majority of the underground injection control programs. Requiring the Federal government to commence enforcement actions for every violation, if the State does not do so within 30 days, runs counter to the spirit of the delegation and could disrupt our working relationship with the States.

EPA opposes a new Federal cause of action for tampering with public water supplies because it is unnecessary. Most State and local governments already have sufficient authority to deal with tampering of public water systems. In many cases, some Federal law is also violated, so that Federal authorities may be used to investigate and prosecute.

Generally, we agree that technical assistance enhances compliance among small systems, and the primacy States already conduct such programs, as EPA does for the non-primacy States. These activities are supported by the existing State program grants. In addition, EPA and the Farmers Home Administration fund the National Rural Water Association, an organization providing operator training and technical assistance to rural water systems, including a circuit-rider program. EPA's contribution was $1.9 million for FY 84. Therefore, we believe that the funds authorized by thes amendments are unnecessary.

We oppose the total authorization of $121 million contained in S. 2649 because it is $65 million (or 116%) above the President's $56 million budget request for all Safe Drinking Water Act programs and grants.

The Agency believes that monitoring underground sources of drinking water at Class I well sites may sometimes be appropriate but has concluded that a specific monitoring program cannot be established through regulation, because, to be effective, it must be tailored to the conditions at each site to be effective. Therefore, our regulations require monitoring to be considered as a condition of each individual permit. We believe that any more specificity in regulation is unnecessary and undesirable. A monitoring program is useful only when there is a reason to suspect that a pathway of contamination may exist and a monitoring program can be designed for early detection. In normal circumstances, it is very difficult to predict the path that fluid would take in the unlikely event that it would migrate from the injection zone. Monitoring could actually be harmful by creating additional pathways for migration of injection fluids or saline waters into fresh water aquifers. Our UIC regulations as they exist focus primarily on continuous monitoring of the integrity of the well materials and periodic testing of the integrity of the cement in the well bore rather than monitoring migration into fresh water.

Similarly, while supporting the concept that fresh water aquifers should be cleaned up to the greatest extent possible following termination of mining operation, we do not believe that the regulations need to be changed to address this issue. Even though the current regulations do not use the word "restoration", they do require at 40 CFR 146.10(d) that "The plugging and abandonment plan .... shall, in the case of a Class III project which underlies or is in an aquifer which has been exempted .... also demonstrate adequate protection of USDWs. The Director shall prescribe aquifer cleanup and monitoring where he deems necessary and feasible to ensure adequate protection of USDWs."

We believe that this language is appropriate since it gives the States discretion to require more or less stringent clean-up levels as long as USDWs are protected. In fact, some States require that water be restored to background levels, while others allow for clean-up to specified standards. The States that regulate uranium in-situ mining (at this time the only type of Class III operation taking place in fresh water) have adopted regulations that require that aquifers be restored after mining.

Conclusion

Mr. Chairman, this concludes my prepared remarks. I would be glad to answer any questions which you or members of the Subcommittee might have.

FY 1983 STATUS REPORT
The National Public Water System Program

Prepared by
The Office of Drinking Water
U.S.Environmental Protection Agency
April 1984

FEDERAL REGULATORY REQUIREMENT

A TOTAL OF 57 STATES OR TERRITORIES ARE ACCOUNTABLE UNITS UNDER THE FEDERAL DRINKING WATER PROGRAM:

- 52 STATES HAVE PRIMARY ENFORCEMENT RESPONSIBILITY (PRIMACY)
- 5 PROGRAMS ARE BEING ADMINISTERED BY EPA REGIONAL OFFICES (REGIONAL PRIMACY).

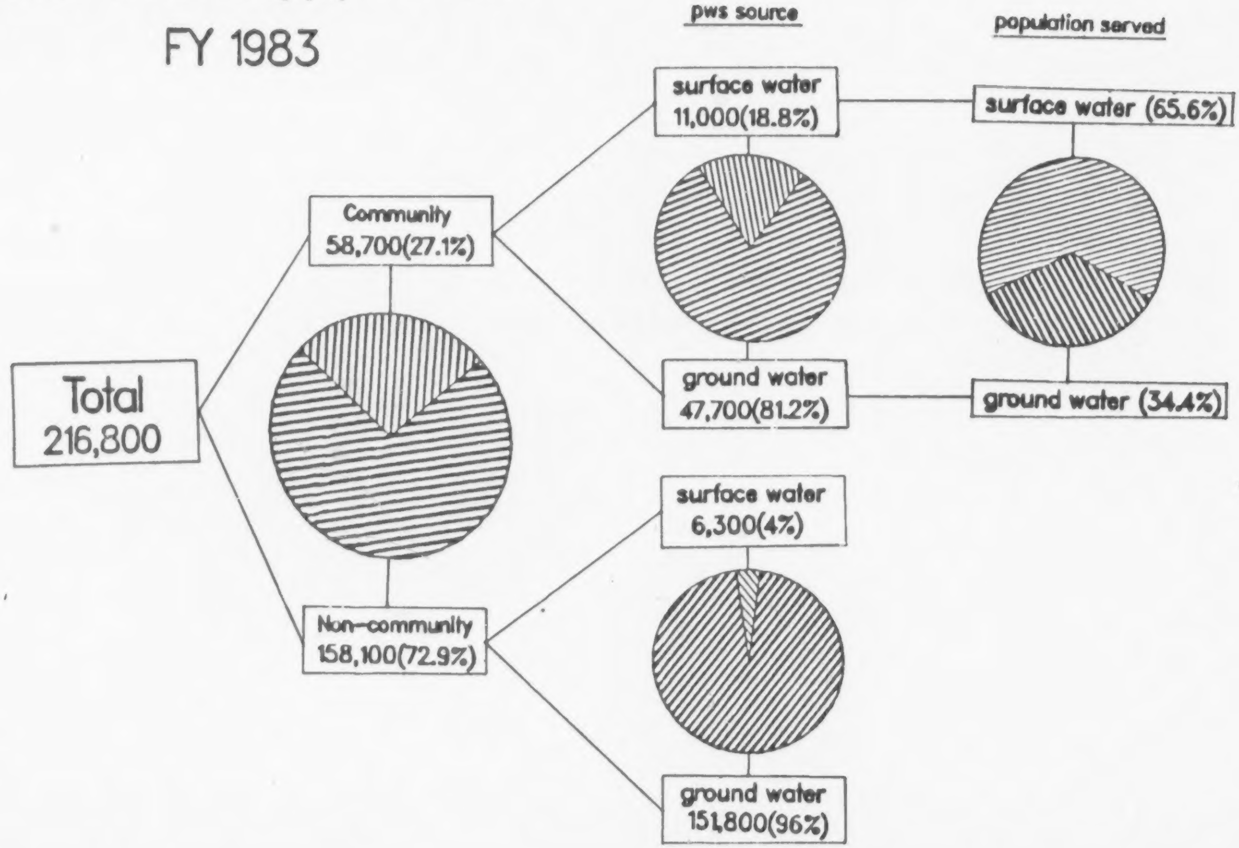
MCL'S	MAXIMUM CONTAMINANT LEVELS (MCL'S) FOR MICROBIOLOGICAL CONTAMINANTS, TURBIDITY, AND CHEMICAL CONTAMINANTS INCLUDE OVER TWENTY SPECIFIC CHEMICAL, RADIOLOGICAL ELEMENTS OR ORGANISMS WHICH ARE UNDESIRABLE IN DRINKING WATER.
M/R	IN ORDER TO ENSURE THAT DRINKING WATER IS SAFE, THERE IS REQUIRED MONITORING AND REPORTING (M/R) FOR EACH OF THESE MCL'S AT A SPECIFIED FREQUENCY ACCORDING TO THE CHARACTERISTICS OF THE PUBLIC WATER SYSTEM (PWS).
FRDS	ON AN ANNUAL BASIS, THE STATES AND EPA REGIONAL OFFICES ARE REQUIRED TO FORWARD TO EPA'S OFFICE OF DRINKING WATER STATUS REPORTS WHICH INDICATE HOW SUCCESSFULLY REGULATORY REQUIREMENTS WERE MET. THESE DATA ARE STORED IN THE FEDERAL REPORTING DATA SYSTEM.

PUBLIC WATER SUPPLY IN U.S.

THERE ARE APPROXIMATELY 216,800 WATER SYSTEMS UNDER FEDERAL JURISDICTION.

- OF THESE, 27% (58,700) SERVE PRIMARILY RESIDENTIAL SERVICE AREAS (COMMUNITY WATER SYSTEMS) AND 73% SERVE PRIMARILY TRANSIENTS (NON-COMMUNITY WATER SYSTEMS).
- OF THE COMMUNITY PUBLIC WATER SYSTEMS,
  - SURFACE WATER IS THE PRIMARY SOURCE OF 18.8% OF THE SYSTEMS, AND SERVES 65.6% OF THE POPULATION;
  - GROUND WATER SERVES 81.2% OF THE SYSTEMS AND 34.4% OF THE POPULATION.
- OF THE NON-COMMUNITY SYSTEMS 96% ARE SERVED BY GROUND-WATER SOURCES.

Public Water Supply in Nation
FY 1983



SYSTEM SIZE CATEGORIES

SIZE	POPULATION SERVED
VERY SMALL	25 - 500
SMALL	501 - 3,300
MEDIUM	3,301 - 10,000
LARGE	10,001 - 100,000
VERY LARGE	GREATER THAN 100,000

NOTE: FOR PURPOSES OF THIS ANALYSIS, THE SYSTEMS ARE DIVIDED INTO FIVE SIZE CATEGORIES. THE BREAK AT 3,300 IS BASED ON THE REQUIREMENT FOR MICROBIOLOGICAL MONITORING -- SYSTEMS SAMPLE MONTHLY AND DETERMINE COMPLIANCE QUARTERLY, BASED ON THREE MONTHS OF SAMPLING (STATES MAY REQUIRE BOTH MONTHLY MONITORING AND COMPLIANCE DETERMINATION).

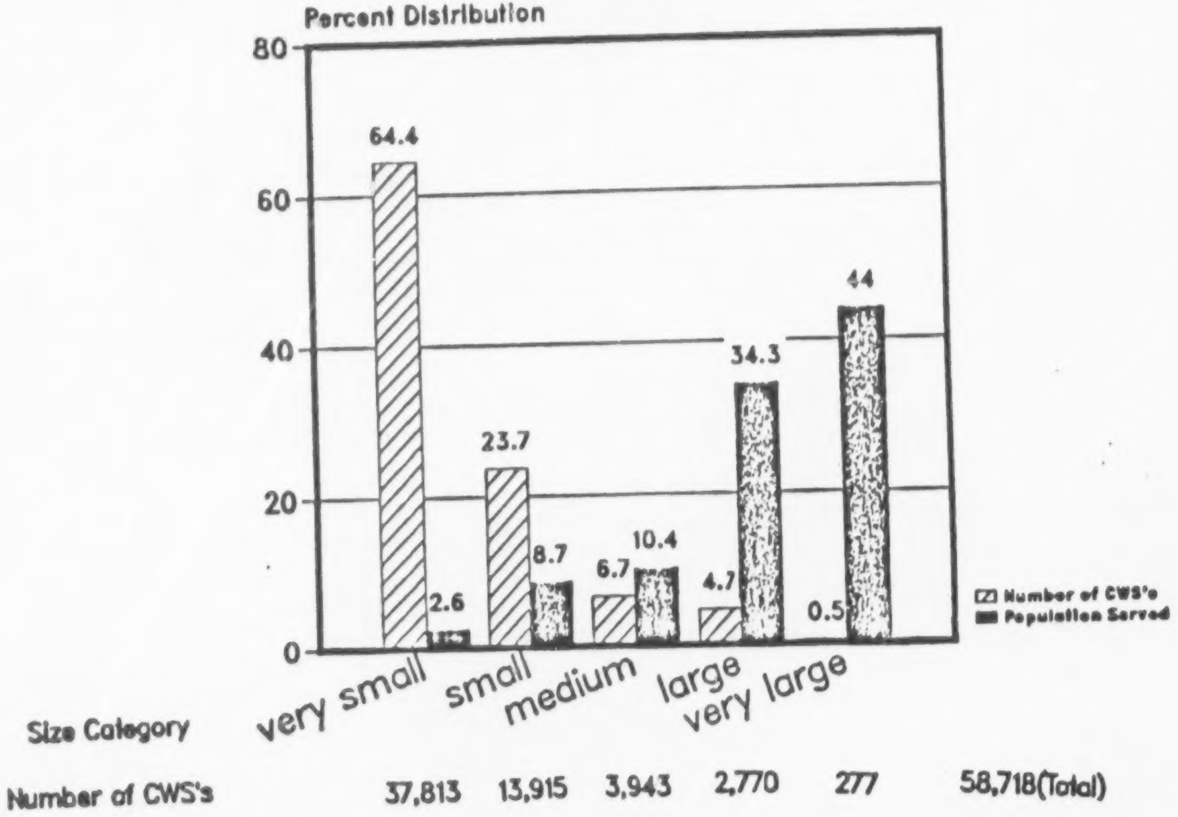
SIZE DISTRIBUTION OF CWS'S

OF THE 58,700 COMMUNITY SYSTEMS,

- 64.4% OF THE SYSTEMS SERVE LESS THAN 2.6% OF THE POPULATION;
- ABOUT 0.5% OF THE SYSTEMS SERVE MORE THAN 44% OF THE POPULATION.

. AS WE HAVE REALIZED FROM THE BEGINNING, THERE ARE SIGNIFICANT NUMBERS OF SMALL AND VERY SMALL SYSTEMS, AND THE PROBLEMS EXPERIENCED BY THESE PLACE A REAL DEMAND ON THE RESOURCES OF THE PRIMACY AGENTS.

Size Distribution of CWS's
FY 1983



TYPE OF VIOLATIONS

PERSISTENT : 4 OR MORE MONTHS IN VIOLATION OR MORE THAN 1 QUARTER IN VIOLATION:

INTERMITTENT : 3 OR FEWER MONTHS IN VIOLATION OR 1 QUARTER IN VIOLATION.

NOTE: THIS ANALYSIS PRESENTS VIOLATIONS IN TERMS OF DURATION. WE ARE MORE CONCERNED WITH PERSISTENT VIOLATORS -- 4 OR MORE MONTHS, OR MORE THAN 1 QUARTER, AND WE ARE DIFFERENTIATING BETWEEN SYSTEMS WITH RECURRING OR CHRONIC VIOLATIONS AND SYSTEMS WITH INTERMITTENT OR SHORT-TERM VIOLATIONS.

NATIONAL MICROBIOLOGICAL COMPLIANCE

VERIFICATION OF THE REPORTS SUBMITTED BY THE STATES HAS BEEN OCCURRING FOR THE LAST TWO YEARS. THE VERIFICATION EFFORT HAS HELPED THE STATES TO IMPROVE THEIR DATA MANAGEMENT SYSTEMS AND TO IMPROVE THE QUALITY OF THE REPORTS. THE IMPROVED REPORTING HAS RESULTED IN AN APPARENT INCREASE IN VIOLATION RATES; THIS MAY NOT HAVE BEEN AN INCREASE IN ACTUAL VIOLATIONS BUT ONLY AN INCREASE IN REPORTED VIOLATIONS.

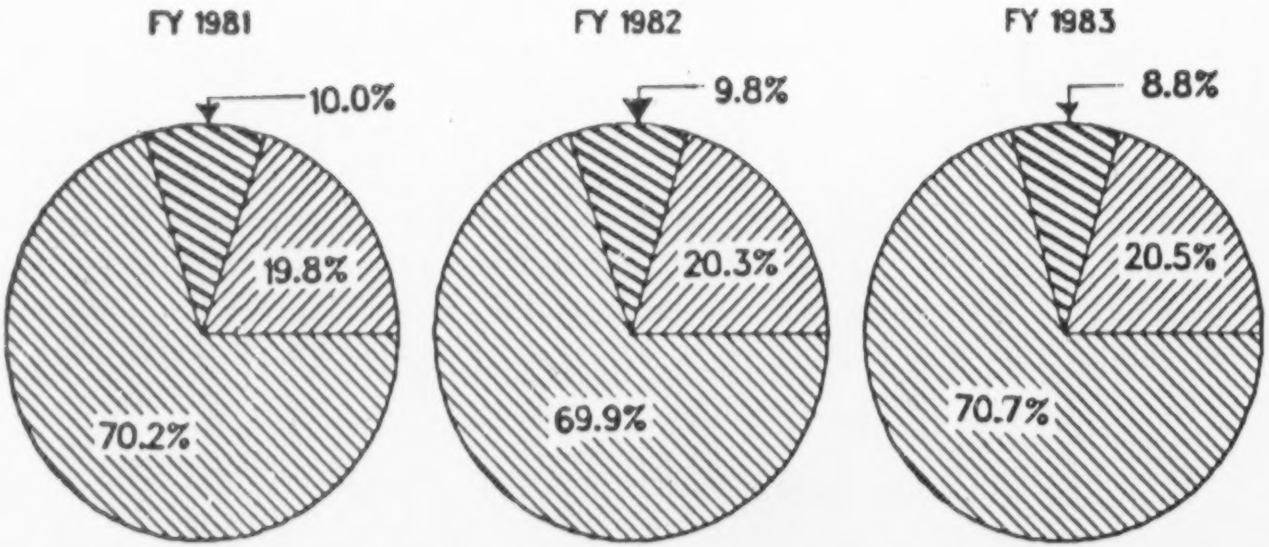
IN FY 1981, 70.2% OF THE SYSTEMS WERE REPORTED IN COMPLIANCE; 19.8% WERE INTERMITTENT VIOLATORS AND 10.0% WERE PERSISTENT VIOLATORS.

IN FY 1982, 69.9% OF THE SYSTEMS WERE REPORTED IN COMPLIANCE; 20.3% WERE INTERMITTENT VIOLATORS AND 9.8% WERE PERSISTENT VIOLATORS.

IN FY 1983, 70.7% OF THE SYSTEMS WERE REPORTED IN COMPLIANCE; 20.5% WERE INTERMITTENT VIOLATORS AND 8.8% WERE PERSISTENT VIOLATORS.

National Microbiological Compliance
MCL & M/R
FY1981—FY1983

▨ Intermittent
▨ Persistent
▨ Full Compliance



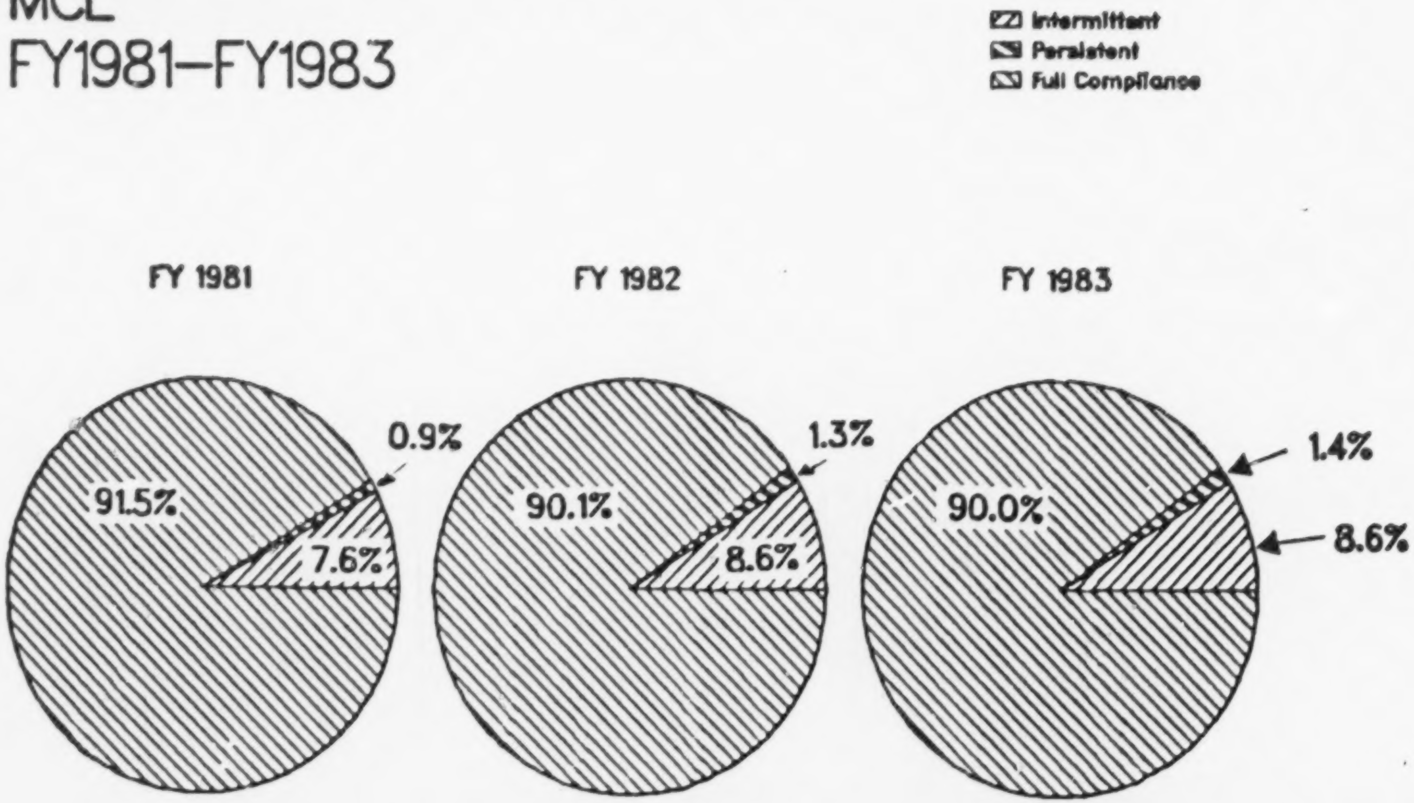
NATIONAL MICROBIOLOGICAL MCL COMPLIANCE

In FY 1981, 91.5% of the systems reportedly met the MCL requirements; 7.6 % were intermittent violators of the MCL and 0.9 % were persistent violators of the MCL.

In FY 1982, 90.1% of the systems met the MCL requirements; 8.6% were intermittent violators of the MCL and 1.3% were persistent violators of the MCL.

In FY 1983, 90% of the systems met the MCL requirements; 8.6% were intermittent violators of the MCL and 1.4% were persistent violators of the MCL.

National Microbiological Compliance
MCL
FY1981—FY1983



NATIONAL MICROBIOLOGICAL MONITORING COMPLIANCE

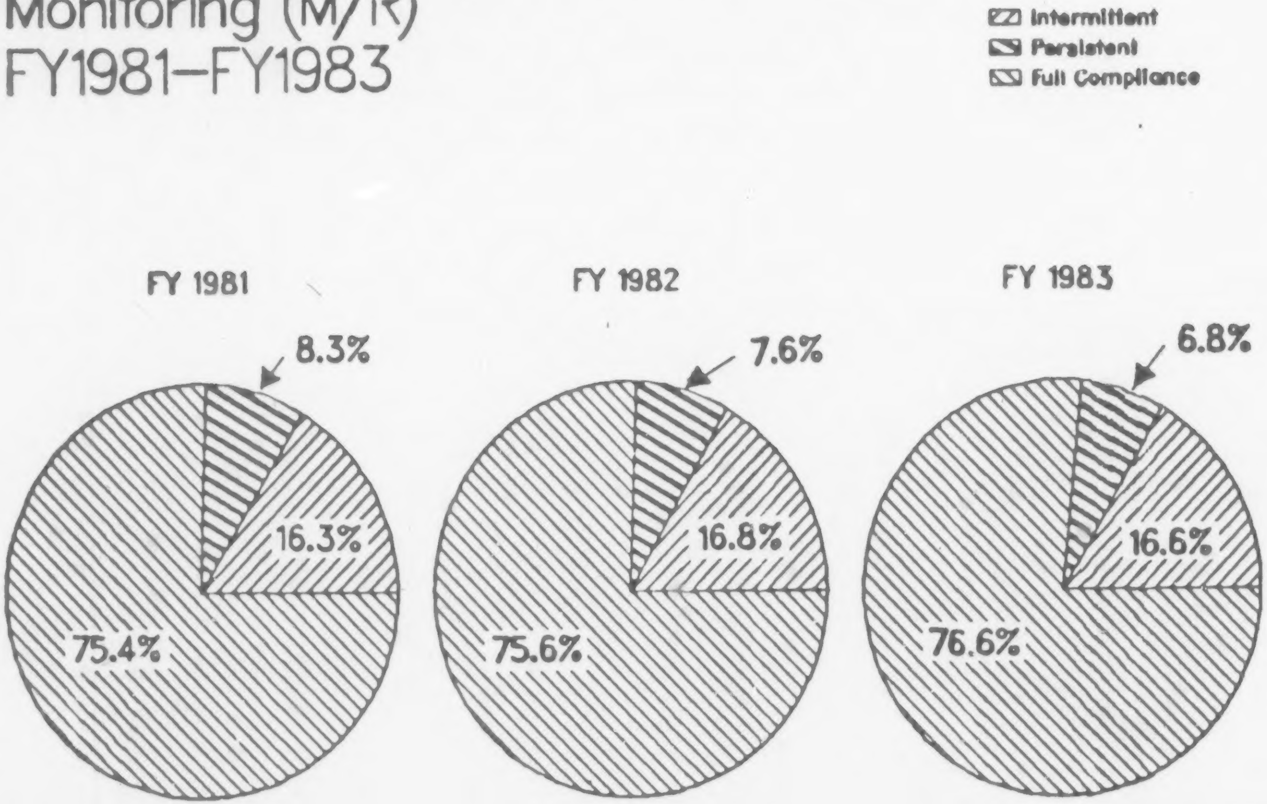
IN FY 1981, 75.4% OF THE SYSTEMS REPORTEDLY MET ALL THE M/R REQUIREMENTS; 16.3% WERE INTERMITTENT VIOLATORS AND 8.3% WERE PERSISTENT VIOLATORS.

IN FY 1982, 75.6% OF THE SYSTEMS REPORTEDLY MET ALL THE M/R REQUIREMENTS; 16.8% WERE INTERMITTENT VIOLATORS AND 7.6% WERE PERSISTENT VIOLATORS.

IN FY 1983, 76.6% OF THE SYSTEMS REPORTEDLY MET ALL THE MONITORING AND REPORTING REQUIREMENTS.

- 6.8% OF THE SYSTEMS WERE INTERMITTENT VIOLATORS;
- 16.6% OF THE SYSTEMS WERE PERSISTENT VIOLATORS.

National Microbiological Compliance Monitoring (M/R) FY1981–FY1983



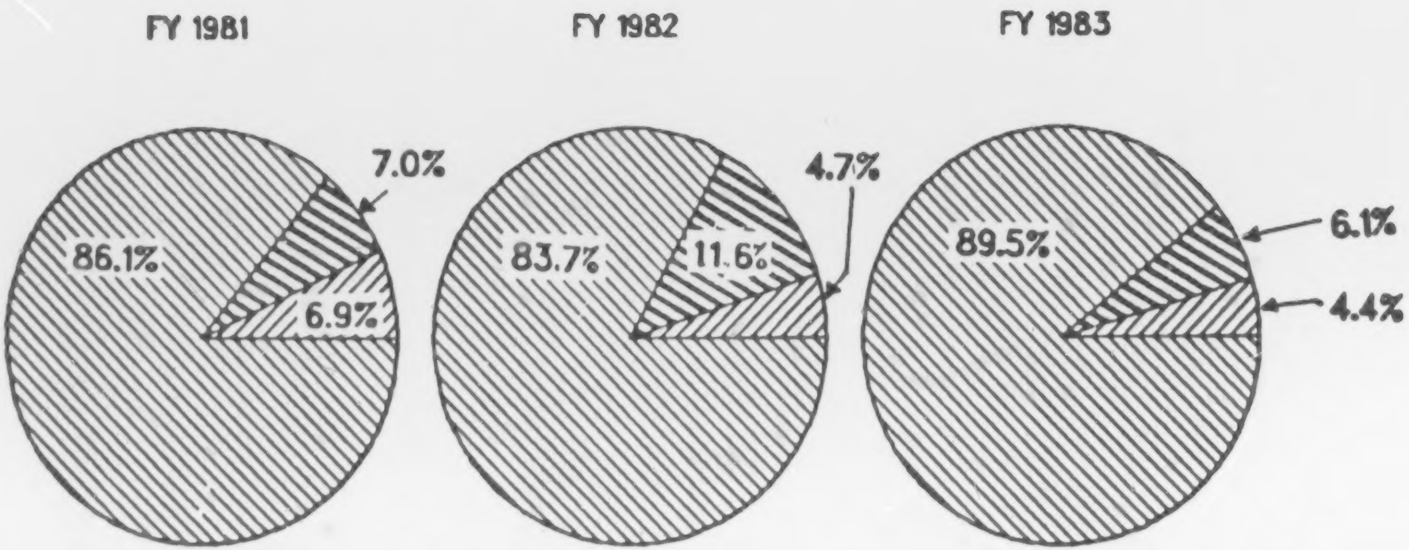
NATIONAL TURBIDITY COMPLIANCE

In FY 1981, 86.1% of the surface systems reportedly met the requirements. 6.9% were intermittent violators and 7.0% were persistent violators.

In FY 1982, 83.7% of the surface systems met the requirements. 4.7% were intermittent violators and 11.6% were persistent violators.

In FY 1983, 89.5% of the surface systems met the requirements. 6.1% were intermittent violators and 4.4% were persistent violators.

National Turbidity Compliance
MCL & M/R
FY1981–FY1983



NATIONAL TURBIDITY MCL COMPLIANCE

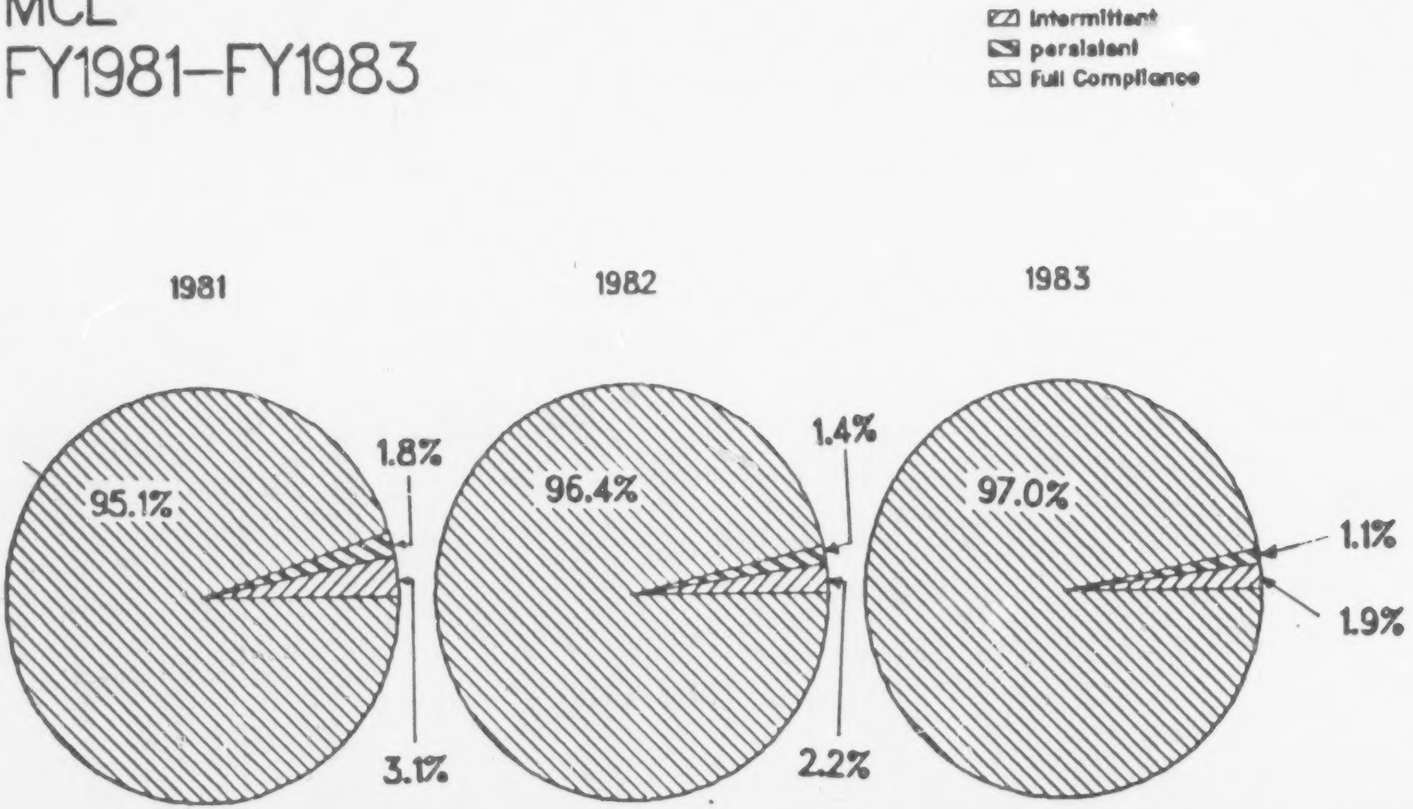
IN FY 1981, 95.1% OF THE SYSTEMS REPORTEDLY MET THE MCL REQUIREMENTS; 3.1% OF THE SYSTEMS WERE INTERMITTENT VIOLATORS AND 1.8% WERE PERSISTENT VIOLATORS.

IN FY 1982, 96.4% OF THE SYSTEMS REPORTEDLY MET THE MCL REQUIREMENT; 2.2% OF THE SYSTEMS WERE INTERMITTENT VIOLATORS; AND 1.4% OF THE SYSTEMS WERE PERSISTENT VIOLATORS.

IN FY 1983, 97% OF THE SYSTEMS REPORTEDLY MET THE MCL REQUIREMENTS.

- 1.1% OF THE SYSTEMS WERE INTERMITTENT VIOLATORS;
- 1.9% OF THE SYSTEMS WERE PERSISTENT VIOLATORS.

National Turbidity Compliance
MCL
FY1981–FY1983



NATIONAL TURBIDITY MONITORING COMPLIANCE

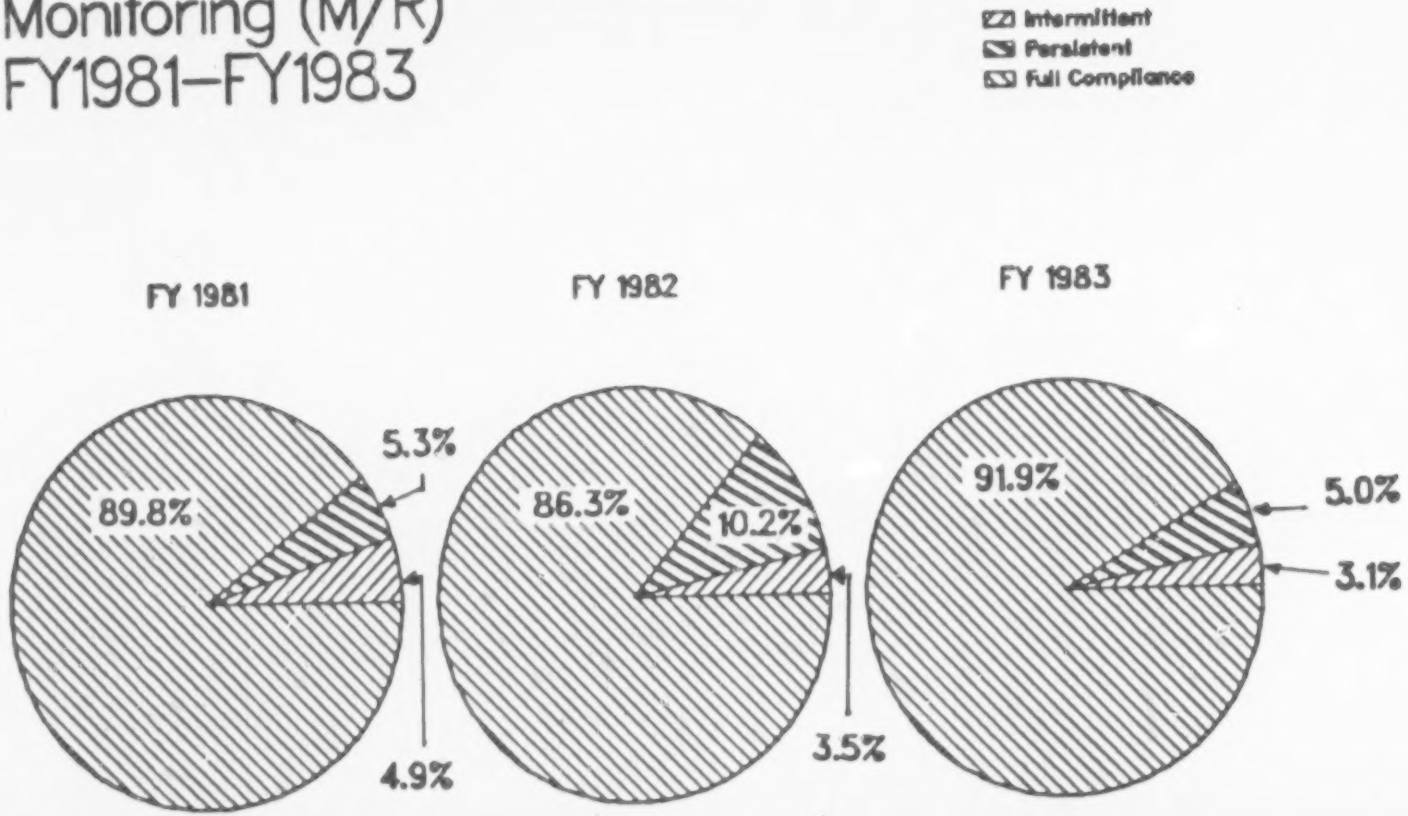
In FY 1981, 89.8% of the systems reportedly met the M/R requirements; 4.9% of the systems were intermittent violators and 5.3% were persistent violators.

In FY 1982, 86.3% of the systems reportedly met the M/R requirement; 3.5% of the systems were intermittent violators; and 10.2% of the systems were persistent violators.

In FY 1983, 91.9% of the systems reportedly met the M/R requirements.

- 3.1% of the systems were intermittent violators;
- 5.0% of the systems were persistent violators.

National Turbidity Compliance Monitoring (M/R) FY1981–FY1983



The high priority activities to be conducted in FY 1984 to implement the three water protection statutes are identified in this section of the guidance. Each major statute is described in an overview statement and major programs which implement a given statute are summarized briefly. The high priority activities for each program for FY 1984 are described in specific "bullet" statements and are identified as the responsibility of either EPA Headquarters Program Offices or EPA Regional Offices and State agencies. Each activity is referenced to a specific quarter in FY 1984 when it will be completed. The activities contained in the text of the guidance form the basis of the Office of Water Accountability System.

A. Safe Drinking Water Act

The Safe Drinking Water Act provides the framework for a national program to assure the safety of drinking water supplies. The Act establishes two programs to protect public health by ensuring the quality of drinking water. Under the Public Water Supply Supervision program, the Nation's public water systems ensure that drinking water quality meets specific standards. The Underground Injection Control program regulates injection wells to avoid contamination of ground water sources of drinking water. The legislation provides for delegation of implementation responsibilities for both programs to the States. EPA must implement a program if the State fails to do so.

The Safe Drinking Water Act gives EPA the responsibility of establishing standards for ensuring the safety of drinking water while encouraging States to accept primary enforcement responsibility (primacy) for implementing these standards. In FY 1984, a primary emphasis of the Public Water Systems Supervision (PWS) program will be to develop final standards for volatile organic chemicals, if regulations are found to be necessary, and to propose revisions to the existing Interim Primary Drinking Water regulations. Interim Primary Drinking Water regulations were originally published in 1975 and amended in 1976, 1978, and 1980. Revised regulations will be based on a comprehensive reassessment of existing standards and an evaluation of new information and data on other significant contaminants.

The PWS program has been underway for a number of years and has achieved a high level of State delegation. The States and the Regions in non-primacy States, have the primary responsibility for activities related to improving compliance with standards by public water systems and for responding to incidents of contamination. The EPA Regional Offices provide both technical assistance and overview to the primacy States in these areas. EPA Headquarters provides a national overview program to assure that Regional and State PWS programs meet Federally mandated requirements and objectives. The Agency also develops Health Advisories (i.e. notices of water contaminant characteristics) and a range of treatment information on unregulated contaminants to support State and Regional activities in response to water supply contamination incidents.

The Underground Injection Control (UIC) program is in an early stage of implementation. Program regulations were promulgated in 1980, a legal challenge was settled, and the regulations amended early in 1982. Like the PWS program, the UIC program establishes a Federal-State relationship for implementation. Based upon Regional Office estimates of State applications for primary enforcement responsibility, forty States and Territories are expected to have assumed primacy by the end of FY 1984. Seventeen States and Territories are expected not to have assumed primacy. EPA oversees implementation of the UIC program in primary States, provides technical assistance to States, and ensures that Federal requirements are met. EPA Regional Offices implement the program in non-primacy States and on Indian lands. The Agency is encouraging non-primacy States to apply for primacy.

1. Public Water Systems Supervision Program

Revision of the existing interim primary drinking water standards will be a high priority activity under the Public Water System supervision program in FY 1984. Revision of the standards, which began in FY 1982, is divided into several phases: (1) volatile synthetic organic chemicals; (2) synthetic organic chemical, inorganic chemicals, and microbiological contaminants; (3) flouride; (4) radionuclides; and (5) disinfection by-products. The approach and process for all phases of revisions will be similar. Initially an advanced notice of public rule-making will be published followed by a publicmeeting and public workshops. Recommended Maximum Contaminant Levels (RMCLs) will then be proposed followed by a comment period and a public hearing. The RMCLs will be promulgated at the same time maximum contaminant levels (MCLs) are proposed. After an MCL public comment period and public hearings, the MCLs will be promulgated.

Region and State PWS program implementation activities will be directed toward three priorities in FY 1984. First, Regions and States are requested to develop strategies to reduce the number of persistent violators of bacteriological and turbidity MCLs and monitoring and reporting requirements (M/R). In developing strategies, EPA Regions and States should negotiate annual compliance targets. Targets should recognize existing high levels of compliance and avoid any deterioration in compliance. Legal action against persistent violators should be undertaken when necessary. Second, Regions and States should respond to instances of significant contamination of ground water and other sources of drinking water. Monitoring around existing hazardous waste disposal facilities, as required by the Resource Conservation and Recovery Act (RCRA) regulations, is likely to identify contamination incidents, some of which may pose a threat to nearby public water supplies. Finally, all public water systems that do not fully comply with the trihalomethane (THM) regulations should be either brought into compliance or placed on a formal compliance schedule.

National Program Directions

Office of Water Operating Guidance and Accountability System

Regional/State Activities

- o States and Regions should implement strategies, developed in FY 1983 based upon the National PWS Compliance Strategy, to achieve the highest possible compliance rates with microbiological and turbidity regulations. (First Quarter and On-going)

	FY 84 Target	Three to Five Year Goal
Microbiological MCL	– 93% compliance; no more than 0.75% persistent violators	– 95% compliance; no persistent violators
Microbiological M/R	– 79% compliance; no more than 7% persistent violators	– 90% compliance; no persistent violators
Turbidity MCL	– 97% compliance; no more than 1% persistent violators	– 98% compliance; no persistent violators
Turbidity M/R	– 92% compliance; no more than 2% persistent violators	– 95% compliance; no persistent violators

- o Regions should negotiate annual compliance targets as part of the State strategies. The target should recognize existing high levels of compliance and avoid any deterioration in compliance. For some States the compliance goals cited above may constitute a serious challenge and appropriate State specific goals should be negotiated. Legal action against persistent violators should be undertaken when necessary. (First Quarter)
- o Regions will develop and implement State-by-State strategies to ensure full delegation of the Public Water Supply System program during FY 1984. (First Quarter and On-going)
- o Regions and States should continue data verification activities to assure that reports are of consistent high quality and truly reflect the quality of the drinking water. (On-going)
- o States and Regions should bring all affected systems into compliance with the THM regulations or place them on a formal compliance schedule. (Fourth quarter)

- States and Regions should respond to the detection of serious contamination of public water supplies, particularly those involving ground water. (On-going)

Headquarters Activities

- Oversee implementation by the Regions and States of a national PWS Compliance Strategy, which provides direction for Regional and State strategies to reduce the number of persistent violators of microbiological and turbidity standards over the next three to five years. (On-going)

- Assist Regions in design and implementation of program delegation strategies and track implementation of strategies. (On-going)

- Promulgate Volatile Organic Chemical regulations, if regulations found to be necessary. (Fourth Quarter)

- Propose MCLs for revised regulations; foster public debate and discussion. (Third and Fourth Quarters)

- Work with the Office of Research and Development to revise the FY 1984 research strategy to reflect changing priorities and objectives. (Third Quarter)

2. Underground Injection Control Program

In FY 1984, EPA will actively work with States which have not assumed primacy of the UIC program and assist them in their efforts to assume primacy by providing technical assistance and review of program plans. EPA will continue to develop guidance on implementation issues as needed including data management, permit issuance, compliance tracking, inspections, and enforcement. The Agency will also review selected data collected by the States and Regions and begin assessment of whether regulatory changes are necessary. In those States which will not assume primacy and on Indian lands, the Regions will be responsible for direct Federal implementation of the UIC Program.

Regional/State Activities

- EPA Regions will implement State-by-State strategies, developed in FY 1983, to achieve primacy in non-primacy States (number to be achieved by each Region will be negotiated at the beginning of the year). (On-going)

National Program Directions

Office of Water Operating Guidance and Accountability Sytem

- EPA Regional Offices will implement programs in about seventeen non-primacy States and on Indian lands, including issuing permits for new and existing injection wells that are required to have permits under the Federal UIC regulations, conducting on-site inspections, and taking enforcement actions where appropriate. (On-going)

- EPA Regions will implement national guidance for oversight of primacy States and provide assistance where requested. The guidance will be developed with involvement of the Regions and States, will be coordinated with the Administrator's policy on oversight, and should be implemented on a State-by-State basis. (On-going)

- In accordance with the requirements of the UIC regulations, those States which were delegated primacy early will assess the threat posed by Class V wells to underground sources of drinking water. These wells are not now subject to specific program requirements and the State assessment will help to determine whether such requrements are necessary. (Assessments due three years from date of original program delegation.)

- Regions and States will develop priority lists for UIC permit issuance in both primacy and non-primacy States and for Indian lands. (First quarter)

Headquarters Activities

- Develop and implement national guidance for oversight of primacy states, in cooperation with the Regions and States. (First quarter)

- Continue to expedite review of State primacy applications to meet FY 1984 goals for State delegation. (On-going)

- Assist Regions with start-up problems in establishing direct implementation programs and issuing permits in non-primacy States and on Indian lands. (On-going)

- Develop the necessary guidance and forms to support direct implementation of UIC programs by EPA in non-primacy States and on Indian lands. (First quarter)

- Develop a quality assurance program for UIC testing in cooperation with the Regions and States. (First quarter)

APPENDIX J

RESOURCE TRENDS

	FY 76 ACTUALS			FY 77 ACTUALS			FY 78 ACTUALS			FY 79 ACTUALS			FY 80 ACTUALS		
	$	PFTE	OPFTE	$	PFTE	OPFTE	$	PFTE	OPFTE	$	PFTE	OPFTE	$	PFTE	OPFTE
HQ	3,884	57	*	6,279	48	*	11,689	99	*	9,297	87	13**	9,492	91	20*
REGIONS PWS	2,140	95	*	3,491	124	*	3,851	132	*	5,373	183	21**	6,638	197	16*
UIC	111	—	*	523	19	*	2,816	19	*	978	34	3**	1,209	40	2*
PWS GRANTS	6,907	—	—	16,737	—	—	19,644	—	—	25,057	—	—	30,779	—	—
UIC GRANTS	—	—	—	—	—	—	—	—	—	6,638	—	—	9,823	—	—
SPEC. STUDIES DEMOS & TRAINING	4,000	—	—	1,520	—	—	840	—	—	2,243	—	—	799	—	—
TOTAL	17,042.0	152	*	28,550.0	191	*	38,840	250	*	49,586	304	37	58,740	328	38
R & D													23,018	143**	46**
Enforcement													702	18**	5**

* Budget documents do not provide this figure
** Figures are approximate based on conversion from FTE to PFTE

	FY 81 ACTUALS			FY 82 ACTUALS			FY 83 ACTUALS		FY 84 CURRENT	
	$	PFTE	OPFTE	$	PFTE	OPFTE	$	FTE	$	FTE
HQ	8,670.3	94.1	21.9	7,476.5	92.7	18.8	8,017.0	103.6	8,264.0	100.5
REGIONS										
PWS	6,916.5	182.1	22.6	6,134.6	145.1	13.8	4,622.3	130.9	4,719.2	132.4
UIC	1,716.8	50.4	7.5	2,818.3	73.7	18.1	3,458.6	100.6	3,767.8	119.5
PWS GRANTS	30,188.8	—	—	29,456.4	--	—	27,654.6	--	27,450.0	—
UIC GRANTS	7,530.4	—	—	6,401.3	--	—	7,039.0	--	7,500.2	—
SPEC. STUDIES DEMOS & TRAINING	1,702.3	—	—	2,013.6	—	--	2,100.0	—	2,100.0	—
TOTAL	56,725.1	326.6	52.0	54,300.7	311.5	50.7	52,891.5	335.1	53,801.2	352.4
R & D	21,851.4	142.5	42.8	30,912.6	142.5	40.5	21,834.6	166.0	23,798.6	186.4
Enf	738.2	22.9	3.7	685.4	20.3	.9	785.5	21.7	1,113.8	29.7

ATTACHMENT 2

STATUS OF THE UIC PROGRAM

	Approved State Programs	Promulgated Federal Programs	Proposed Federal Programs
All Classes	Alabama Arkansas Connecticut Delaware Georgia Illinois Kansas Louisiana Maine Maryland Massachussets New Hampshire New Jersey New Mexico North Carolina Oklahoma Texas Utah West Virginia Wisconsin Wyoming Guam	Alaska Arizona D C Idaho Indiana Iowa Kentucky Michigan Minnesota Montana Nevada New York Pennsylvania Tennessee Virginia American Samoa CNMI Trust Territories	Hawaii Oregon Rhode Island South Carolina South Dakota Vermont Washington Puerto Rico Virgin Islands
Oil & Gas	California Colorado Missouri Nebraska North Dakota Ohio		Florida Mississippi
Other Wells	Florida Mississippi	California Colorado Missouri Nebraska	North Dakota Ohio

SAFE DRINKING WATER ACT AMENDMENTS OF 1984

TUESDAY, JUNE 26, 1984

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON TOXIC SUBSTANCES AND
ENVIRONMENTAL OVERSIGHT,
Washington, DC.

The subcommittee met at 2 p.m. in room SD-406, Dirksen Senate Office Building, Hon. Dave Durenberger (chairman) presiding.

Present: Senator Durenberger.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. Good afternoon and welcome to the third hearing before the Subcommittee on Toxic Substances and Environmental Oversight on the subject of amendments to the Safe Drinking Water Act.

The purpose of this hearing is to receive testimony on the issue of underground waste injection and the regulatory program established under the act to prevent endangerment of underground sources of drinking water from subsurface injections.

This issue is a particularly timely and important one in view of the great public concern over the safe disposal of hazardous waste and the protection of the Nation's groundwater resources. The members of the Committee on Environment and Public Works have spent considerable time considering the environmental and health implications of surface disposal but have not heard a thorough discussion of subsurface disposal. According to the Environmental Protection Agency's 1983 figures, 60 percent of the country's annual load of hazardous waste was disposed of through deep well injection. This proportion is expected to increase in the future because of the economy of this type of disposal and the lack of other sound environmental alternatives. I believe it is incumbent upon the policymakers to examine the benefits and inherent risks as reflected in the current experience, such as the witnesses have to share, to assess the adequacy of the program to provide essential protection to ground water and public health in the future.

The amendments I have introduced in S. 2649 would make several changes in the injection control program. First, the injection of hazardous waste into or above an underground source of drinking water would be prohibited. This language is consistent with EPA's final program regulations issued May 11.

Second, the exemption available for injection into an aquifer containing an underground source of drinking water with between 3,000 and 10,000 total dissolved solids would be eliminated to protect potential water supply sources. Third, restoration of ground water quality would be required after the termination of class III mining activities. Finally, monitoring of the overlying underground source of drinking water down gradient from a class I well, which would be susceptible to contamination from the injection zone, would be required.

Undoubtedly, it is this provision that will generate the most discussion today. The current operation of the program relies on the mechanical integrity of the well itself which must be monitored. The assumption is made that if the well is built and operated properly there will never be cause for contamination. However, there is inherent uncertainty in hydrogeologic systems which cannot be surveyed with the human eye. Contamination from waste injection has come to the public's attention in only a few cases—but it has and can happen. Therefore, it seems wise to provide an early warning system of contamination that may be otherwise undetected for a long period of time.

The witnesses today have been asked both to share their technical and administrative expertise with us, to provide a picture of the current state of the art, and to comment directly on the provisions of the bill.

I look forward to the discussion of this timely topic from Jeffrey Lehnen, project manager, engineering and geology division, CH2M HILL Consultants, Gainesville, FL; Suellen Pirages, director, Institute of Chemical Waste Management; Bill Klemt, chief, underground injection control section, Texas Department of Water Resources; Leslie Bell, head, Underground Injection Control Program, Florida Department of Environmental Regulation; and C.R. Sherman, senior engineering consultant, DuPont DeNemours & Co.

STATEMENT OF JEFFREY LEHNEN, PROJECT MANAGER, CH2M HILL, ENGINEERING CONSULTANTS

Mr. LEHNEN. Thank you, Mr. Chairman, for inviting me here today. My name is Jeffrey D. Lehnen, and I am a hydrogeologist with the engineering-consulting firm of CH2M HILL in Gainesville, FL. I have worked in the fields of ground water hydrology and well design for 7 years with CH2M HILL, and have been associated with the design of 14 class I injection wells for 8 injection systems. Of these wells, 11 are operating successfully and 3 are yet to be constructed.

CH2M HILL is the seventh largest environmental consulting engineering firm in the United States. Our experience with injection well systems in the State of Florida spans 18 years. As you may know, CH2M HILL is also currently active in hazardous waste investigations and cleanup for the Superfund Program and other clients, water resources and environmental studies, water supply development, water and wastewater treatment, as well as numerous public works projects throughout the country.

I would like to comment on the proposed Senate bill 2649. However, to help put our comments in perspective as to how this bill will affect Florida injection systems, I would like to first present an overview of injection activities in Florida.

The use of the subsurface for waste disposal began in this country early in the century by the injection of waste brines associated with the oil and gas industry. These wells are classified as class II and are not addressed by the proposed bill, S. 2649.

Deep well injection of sanitary and nonhazardous industrial wastewaters through class I injection wells began in Florida in 1963, with a system installed at a synthetic fiber manufacturing plant near Pensacola, FL. Since that time, 17 injection systems have been completed and 20 more are in the design phase or are proposed. The rapid development of class I injection as an environmentally sound disposal alternative has come about as a result of the unique hydrogeology of the State, particularly the occurrence of highly permeable rock formations containing saltwater throughout large portions of the State overlaying by thick low permeability confining beds. It also reflects continually more restrictive regulations governing surface water discharge, and the cost-effectiveness of injection relative to other available forms of disposal. As regulatory efforts and philosophy increasingly restrict wastewater discharge, the safe disposal options available to a municipality or industry narrow. Common disposal alternatives available in Florida include land application; percolation ponds; advanced treatment to drinking water standards with reuse; river, lake, or ocean outfalls; and underground injection.

Land application and percolation ponds are reasonably cost-effective for small wastewater volumes; however, the high cost of open land or long distance transmission necessary to reach open land make these alternatives less attractive for large volume systems and systems located in urbanized areas. River and ocean outfalls can be cost effective; however, where other alternatives are available, surface discharge is discouraged. Reuse is very expensive and has not yet gained public acceptance. Underground injection has proven to be a reasonably priced alternative when the required hydrogeologic conditions are present to protect underground sources of drinking water. This disposal technique has enabled many municipalities and industries to solve difficult wastewater disposal problems in a reliably safe and an environmentally sound way.

Time permitting, I will be glad to elaborate further on the major design details of a class I injection system. However, now I would like to comment on the section of S. 2649 that pertains to underground injection technology and its regulation.

We support the further enhancement of the Safe Drinking Water Act to provide needed protection of underground sources of drinking water but make the following suggestions to the bill.

We support section 1426; the prohibition of hazardous waste injection above or into a formation containing an underground source of drinking water, which is now included in S. 2649. In Florida, as in many parts of the country, many hazardous compounds that are placed anywhere in the soil profile—and certainly those placed directly into a source of drinking water—could migrate to a water supply.

It is suggested that the second sentence of this section which now reads: "Injection of contaminated ground water into the aquifer from which it was withdrawn may be allowed" should read: "Injection of treated ground water resulting from an approved cleanup, removal, or remedial action for a contaminated aquifer into the aquifer from which it was withdrawn may be allowed * * *." This would clarify the intent that the ground water to be injected has been treated to remove or reduce the contaminants to an approved level of concentration.

In section 1427(a)(2) the requirement of "monitoring of underground drinking water sources downgradient from a class I injection well" is generally beneficial. The wording, however, may be too restrictive for most cases.

In Florida, class I injection systems typically inject fluid into a highly permeable and cavernous dolomite in which mixing and dilution of the injected fluid and native saltwater occur very rapidly. Bouyancy and hydraulic forces on the injected fluid diminish with distance from the injection well, and therefore the likelihood of contamination of overlying aquifers occurring downgradient is very low. Since these same forces are the highest near the injection well, monitoring of overlying aquifers there provides the earliest possible means of detecting migration of injected fluid.

It is suggested that the wording of this requirement be revised to require the following:

> Monitoring of underground drinking water sources at locations and in such a way that will provide the earliest possible detection of contamination of these underground drinking water sources from a Class I injection well.

Section 1427(b) as written would eliminate section 146.4(c) of title 40 of current regulations. We suggest that section 146.4(c) be retained because it allows a measure of reasonable judgment to be applied by the regulating agency in determining the most beneficial and environmentally logical use of an aquifer on a case-by-case basis. Thus, agencies would continue to be allowed the flexibility necessary to deal with the variable hydrogeologic conditions that exist throughout the country.

Section 146.4(c) states that an:

> Aquifer or portion thereof which meets the criteria for an underground source of drinking water may be exempted from that classification if the total dissolved solids concentration of the water is between 3,000 and 10,000 milligrams per litre and it is not reasonably expected to supply a public water system.

This makes it possible to use an aquifer for class I injection that may contain water with between 3,000 and 10,000 milligrams per litre TDS if it is determined that there is no other beneficial use for that aquifer.

In a carbonate aquifer system such as in Florida and many parts of the country, the production of water from the aquifer is usually from discrete openings or cavities in the limestone and dolomite of the formation. As a result of this stratification, water quality differences can occur in discrete producing intervals within a few feet of each other.

If a discrete cavity contained water with less than 10,000 TDS and could be developed as a USDW, its protection would be warranted. If, however, its yield to a well would be very low, or due to its proximity to much saltier water in the formation, its water quality would eventually degrade, it is unreasonable to protect that cavity by prohibiting use of the formation for class I injection.

This concludes my prepared remarks on S. 2649. I thank the subcommittee for the opportunity to testify and would be glad to answer any further questions you may have or go into further detail of the major design details I referred to earlier.

STATEMENT OF DR. SUELLEN W. PIRAGES, DIRECTOR, INSTITUTE OF CHEMICAL WASTE MANAGEMENT

Dr. **Pirages**. Thank you. My name is Suellen Pirages. I am the director of the Institute of Chemical Waste Management. The institute is a component of the National Solid Wastes Management Association and was formed to promote proper management of chemical and other wastes believed to be hazardous to public health and the environment. The members of our institute engage in all aspects of hazardous waste management, storage, treatment, and disposal. Many of our company firms also dispose of waste using deep well injection practices.

The institute has been a strong supporter of environmental laws and regulations. We have often argued for a uniform regulatory system even when administered by different States.

I would assume that my written remarks will be included in the hearing record in its entirety, is that true?

Senator **Durenberger**. Yes. All the witnesses' written statements will be made part of the record.

Dr. **Pirages**. Given that, I would like to summarize for you the major points of that testimony.

In a recent EPA report, it was noted that 8.6 billion gallons of hazardous waste were placed in deep wells during 1981. It is interesting to note, at least I think it is, that 5.7 billion gallons of that amount was placed in deep wells in Texas alone. Our institute feels that when properly constructed and operated, deep well injection can be a safe and successful mode of disposal for hazardous waste. This success, however, will depend on regional geology. It requires very deep reservoirs, generally thousands of feet from the surface, overlaid by thick impermeable strata.

The most suitable areas in our Nation for deep wells are the north central areas, the Midwest, the south central areas, and the gulf coast.

Site selection requires evaluating many factors, hydrology, geology, climatic conditions and seismic stability. What is the most important factor, however, is to determine whether the naturally existing reservoir has the capability to contain and isolate the liquid material.

Not all wastes are suitable for disposal in a deep well. We feel suitable wastes are those that are dilute aqueous solutions.

Because of the nature of the receiving zone in the deep well, large solids are usually undesirable in a class I well. Therefore, most of our companies filter out large solids down to a size of one micron.

Most wastes are tested and pretreated to make sure they are compatible with the well site. We feel that because of pretreatment and because of the type of monitoring required by EPA and State agencies, deep well injection is a safe method for dilute hazardous wastes, those wastes that cannot be treated chemically or biologically, those wastes that do not have high energy values to be effectively incinerated, and those wastes that are too aqueous to be put into a landfill.

For our member companys, quality control is a very important factor. Before accepting a client, the waste is analyzed for its compatability with other wastes being treated at the site and for compatability with the well structure and facilities on the site. Corrosive wastes and gas-generating wastes are either pretreated or, if they cannot be pretreated and made compatible, are rejected. Once the hazardous waste reaches a facility, it is then tested and analyzed to determine that it is what the manifest says it is and if necessary, pretreated before being injected into the well.

Monitoring is an important aspect of any deep well facility. The type of facility will vary from place to place depending on the type of wastes that are being handled and the treatment needs of those particular wastes.

All equipment and tanks on the surface are monitored routinely to make sure there are no leaks. In addition, we monitor the well pressure, flow rates of the material going into the well and the pH of the liquid.

If I might just describe a deep well. We have an injection tubing that is surrounded by a protective casing. Surrounding the protective casing are three additional steel casings with the inter-spaces filled with acid resistant cement. The space between the injection tube and protecting casing is fluid-filled and maintained at a constant pressure; I think it is generally 100 pounds per square inch greater than the actual injection well pressure. This is called the annulus pressure. The annulus pressure is continously monitored during operation of a facility. Any change in that pressure will result in the shutdown of operations. A change in the pressure means there is a leak either in the injection tubing or protective casing. The operation will not start again until that leak or the cause of the change in pressure has been identified and corrected.

We feel that with this type of monitoring we can preclude the development of serious leaks because a leak, even though small, will be detected immediately.

Our institute feels that the success of stringent regulations and regulatory programs will make deep wells desireable disposal methods for certain types of wastes. We also feel, however, that no matter how stringent a regulation may be, what is absolutely necessary is the strict enforcement of those regulations, which we strongly support. If we have strict enforcement of the existing UIC regulations, we feel there will be a reduction in the very few instances of contamination problems associated with deep well disposal methods.

I would also suggest that the isolated instances where contamination has been associated with deep wells were probably due to lack of proper monitoring during operation and also less adequate technology than is now being used.

Our institute would question the advisability of legislation that mandates specific monitoring requirements for the UIC Program. Monitoring, as I said, is a very important part of any facility operation, but we feel that EPA should have some flexibility to make requirements on a site-specific basis. The monitoring needs are site-specific and if legislation is too restrictive in monitoring requirements, EPA may not be able to require something that is necessary at a particular site.

I thank you for the opportunity to present this statement and would be happy to answer any questions.

STATEMENT OF BILL KLEMT, CHIEF, UNDERGROUND INJECTION CONTROL SECTION, TEXAS DEPARTMENT OF WATER RESOURCES

Mr. **Klemt**. Mr. Chairman, my name is Bill Klemt. I am chief of the Texas Department of Water Resources' Underground Injection Control Section. On behalf of the department, I want to express my appreciation for allowing us to appear before your subcommittee.

I would request that the complete statement be entered into the record.

Senator **Durenberger**. It will be.

Mr. **Klemt**. The following comments will briefly summarize the history and use of injection wells in Texas. The sequence of legislative action to ensure protection of ground water resources; the number of injection wells in Texas; the Texas underground injection control program requirements; and section 1427(A)(2) under the heading "Regulation of State Programs." And, finally, certain remarks directed to the Safe Water Drinking Act Amendments of 1984 and more specifically the requirement to install monitoring wells downgradient from class I injection wells.

Underground injection began in Texas over 70 years ago with sulfur mining by the Frasch process. The first major project utilizing injection wells for the disposal of liquid wastes occurred in 1938 in the east Texas oil field where salt water produced with oil from the woodbine formation was returned to the lower part of the formation.

Today, the Texas Railroad Commission regulates subsurface injection associated with the oil and gas industry, while the Texas Department of Water Resources regulates the majority of other underground injections in the State.

Under the Injection Well Act of 1981, these injections are presently regulated—the first Injection Well Act was in 1961 and at that time essentially split jurisdiction between the Texas Railroad Commission and the Texas Department of Water Resources for underground injection. Those oil and gas related activities are handled by the Texas Railroad Commission and industrial waste disposal by the Texas Department of Water Resources.

Texas has more than 40,000 class II injection wells associated with the production of oil and gas, in excess of 20,000 class III solution mining wells, approximately 120 class I waste disposal wells, and an unknown number of miscellaneous wells. The application of underground injection wells includes: municipal and industrial waste disposal; secondary oil recovery and salt water disposal; storage of natural gas and petroleum products in underground reservoirs; prevention of the intrusion of undesirable water into fresh ground water resources; recovery of minerals, such as sulfur, uranium, and sodium sulfate; injection of fluids to control land-surface subsidence; and the injection of excess agricultural or urban runoff and excess ponded surface waters.

Over the years, the department has developed rules and guidelines setting forth minimum construction, operating, monitoring, reporting, and recordkeeping requirements for all permitted injection operations. Construction requirements set forth minimum standards for cementing methods and materials, well construction materials, use of packers or an approved equivalent, logging and preoperation testing programs, and injection zone data to be determined. Operating requirements include limitations of injection pressure, injection rates, and volumes of liquids injected. And monitoring involves injection fluid analysis; recording of injection pressure, flow rates and volume, and annulus pressure.

At this time, Mr. Chairman, I would like to introduce a paper that I am going to give to the American Institute of Chemical Engineers in August. I would like to read a few sections from that paper and also refer you to figure 4 which is a schematic of an injection well.

Senator DURENBERGER. Without objection, the paper will be made part of the record. [See p. 260.]

Mr. KLEMT. Thank you, sir.

I will start reading from the bottom of page 18 and it is entitled "Well Construction Practices."

> The construction of a waste disposal well must be such that groundwater resources are adequately protected and the injected fluid is confined to the disposal zone. A typical Texas Gulf Coast industrial waste disposal well would be completed as shown on Figure 4 . . .

It is a very generalized schematic which would show you how it is constructed. It will contain 1,000 feet of surface casing, 6,000 feet of long string, all of which—both strings—are cemented back to surface. The long string casing is set from the land surface through the top or total disposal zone. The casing is pressure tested to ensure there are no leaks.

> Injection of waste, as shown in Figure 4 is through tubing which is set on a packer and is made of materials which will not be affected by the injected waste. . . .
>
> A pressure gage should be installed on the well head for monitoring the pressure on the annulus between the injection tubing and the long string. Now, remember, this is an annulus space, it is filled with fluid, it is pressurized; and on one side we have the long string casing, on the other side we have the injection tubing so that if we are able to maintain a pressure in this annulus space which is different than the pressure inside the injection tubing, and if there is a failure you will know it instantly and you can shut the well down. Should a leak occur in the tubing or packer seat, a pressure change in the annulus will be indicated by the annulus gauge and remedial action can be initiated to correct the malfunction. . . .

I would like to continue now to read from the department's statement and start at the bottom of page 3.

The installation of monitoring wells around class I injection wells has been considered numerous times by staff and discussed extensively in public hearings concerning class I injection wells. However, the questionable capabilities of such wells to effectively monitor the operational status of a class I injection well have thus far outweighted proposals to require monitor wells. The department offers the following comments regarding this issue:

The installation of monitoring wells into sources of drinking water will not detect excursions from an injection zone unless:

A. Monitoring wells are precisely located and completed in an aquifer containing drinking water at the site or sites where an excursion from the injection zone would migrate. In the case of deep basin circulation where the injection zone is several thousand feet below the base of usable-quality ground water, a possible excursion may require millions of years to enter an underground source of drinking water and may occur hundreds of miles in the down gradient direction from an injection site.

Selecting effective monitoring well sites under these conditions would be fortuitous at best, and in reality, impossible.

B. Should a monitoring well be placed in close proximity to an injection well, any excursion would most likely be due to a casing leak. As such, monitoring at the injection well annulus pressure would provide immediate detection of a leak, whereas a monitoring well could fail to detect an excursion altogether.

In Texas, the record of success of industrial waste disposal wells without a single demonstrated case of usable-quality ground water contamination is in a large part the result of regulation by permit which includes:

First. Requiring good casing and cementing practices in well construction;

Second. Limitations on maximum allowable surface injection pressure and injection rate;

Third. Evaluation of reservoir properties and artificial penetrations;

Fourth. Well integrity monitoring to detect malfunctions or materials failures such as casing, tubing, or packer leaks;

Fifth. Recordkeeping, reporting requirements, and periodic inspection to check for permit compliance; and,

Sixth. Financial assurance for proper plugging of injection wells upon termination of the operation.

In conclusion, the Texas Department of Water Resources does not believe, at this time, there is sufficient evidence that installing monitoring wells around class I wells provides significant added security benefits. And in fact, you may be lulled into a false sense of security.

Thank you, sir.

Senator **Durenberger**. Miss Bell.

STATEMENT OF LESLIE BELL, HEAD, UNDERGROUND INJECTION CONTROL PROGRAM, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Miss **Bell**. Thank you for the opportunity to testify today. I have been asked to relay Florida's experiences with the Underground Injection Control Program, to provide our comments on the proposed amendments, and to comment on the existing Federal UIC regulations.

The Florida Department of Environmental Regulation has had primary enforcement responsibility for class I, III, IV, and V wells, since February 1983. Our principal objective has been to protect our valuable underground drinking water sources from improper injection practices, yet still permit this waste disposal method where hydrogeologically feasible. Figure 1 on page 2 of the written testimony depicts the general location of Florida's underground sources of drinking water, confining and injection zones, and typical well construction designs for class I and V wells. I would also like to point out the first permeable zone above the injection zone, as I will refer to it throughout my presentation. It is the second limestone aquifer at the generalized 2,000–2,500-foot depth. We have 19 class I industrial and 50 class I municipal wells either proposed or constructed, and approximately 9,600 class V wells. Locations of the class I wells are shown on figure 2, page 4.

The Florida program for class I wells is more stringent and explicit than the Federal program. One of the more successful differences with the program has been the technical advisory committees, which consist of department and water management district representatives, EPA Region IV, and the U.S. Geological Survey. These committees review proposed class I projects for conceptual approval, construction, testing, operation, and monitoring. Construction and testing requirements for class I wells are also more detailed in our program. Examples are provided on page 5 and 6, but probably the greatest difference between the two programs is in the area of class I well monitoring.

We have required monitoring since 1964. Quite frankly, initial reasons for monitoring were that injection well disposal was an unproven technology in Florida, we had no data on how the aquifer system would respond to stress of injection and public opposition or misunderstanding could be countered with reliable data. For these reasons, early injection well users had elaborate monitoring requirements. At the minimum, our philosophy was to monitor the first permeable zone above the confining zone for water level or water quality changes. This would provide an early warning if waste was migrating toward an overlying underground source of drinking water.

Two types of monitoring are associated with class I wells. The injection well itself can be monitored for mechanical integrity, and the aquifer system can be monitored for fluid migration and effects of injection.

Mechanical integrity monitoring consists of two parts: Monitoring for leaks in the well itself and monitoring for fluid movement outside and around the well bore. The methods EPA promulgated to monitor these two aspects of mechanical integrity could not be applied in the large diameter, 24 inch, municipal wells in south Florida. Consequently, we decided monitoring of overlying aquifers would substitute for these tests and still provide early detection of fluid migration.

Monitoring of the aquifer system is an integral part of the Florida program. Our State rule specifies at least one monitor well with an injection well system, and describes specific monitor well construction standards. Aquifer system monitor wells are of the three types that serve different purposes. Table 1 on page 7 describes these types. The most common one, and the type that nearly all injection well systems in Florida have, are on-site wells. These are usually less than 100 feet from the injection well and are open to the first permeable zone. Their purpose is to detect upward fluid migration and pressure or water level changes. Satellite monitor wells are usually less than 1,000 feet from the injection well, are open to the injection zone, and are used to track rate and direction of the waste front movement, geochemical changes in the waste, and any pressure buildup in the injection zone. Regional monitor wells are several miles from at least two nearby injection well sites, and are used to detect any pressure buildup in the injection zone. If you will look on page 11, the most extensive monitoring system of an industrial injection site in Florida is diagrammed. Over 19 billion gallons of acid injection waste have been injected at this site. The on-site or shallow monitor well has detected no diluted waste or pressure buildup in the first permeable zone. This indicates that the lower confining zone, the Bucatunna Clay, is working. I brought some samples from the cores if you would like to see that clay.

The south deep satellite monitor well detected the waste front arrival in 1973, and there is some indication the waste may have arrived at the north deep satellite well. Pressure buildup has been detected at both monitor wells. Water quality samples from these wells have also provided some answers on how the waste is geochemically altered in this environment. Regional monitor wells 17–22 miles away, not shown on diagram, have detected pressure increases in the injection zone.

Our position on the proposed monitoring amendments is that we agree with the concept of monitoring but not quite with the location. Rather than monitoring all underground sources of drinking water, we would suggest that a more cost-effective approach would be to monitor the first permeable zone, regardless of whether it is a drinking water source. Lack of effective confinement would then be detected before considerable contamination of an underground source of drinking water had occurred. Additionally, if the gradient in the injection zone is negligible, other factors may have a greater effect on waste movement. We offer this wording to replace the proposed language:

> (2) Monitoring associated with Class I wells to provide the earliest possible detection of fluid migration into, or in the direction of, underground sources of drinking water.

As requested, we offer comments on two other UIC amendments:

Section 1426—restrictions on hazardous waste injection. We agree with this amendment as we accomplished a complete class IV well ban through Governor and Cabinet approval in 1981.

Section 1427(b)—exempted aquifer criteria. We do not support this proposed amendment. A comprehensive water resources assessment at a given location may determine that the most reasonable and beneficial use of ground water with 3,000–10,000 milligrams per liter total dissolved solids meeting the criteria specified in 40 CFR 146.4(c) would be for waste injection. States should continue to have the flexibility to make this assessment on a case-by-case basis.

We were also asked to comment on the existing Federal UIC regulations. Page 16 lists several areas of concerns. I have a brief comment on the last one concerning class V wells.

Probably the greatest difficulty we have had with the Federal regulations has been with class V wells. Elaborate class I well regulations exist to insure that no injection fluid migrates into an underground source of drinking water. Yet class V wells conduct the identical waste, excepting only hazarodus waste, directly into an underground source of drinking water, without the benefit of prior mixing, dilution, and geochemical alterations. The only preinjection water quality criteria that have to be met are the primary drinking water standards and a general protection for public health. Since class V wells are much less expensive to construct and operate than class I wells, Florida experienced a rush of class V well applications, primarily to inject domestic sewage, after the UIC Program went into effect. Strict State water quality criteria and a Senate bill killed most of these projects, but the Florida program would like to see the next refinement of the UIC regulations concentrating on more detailed construction and water quality standards for class V wells.

Thank you very much. I will be happy to answer any questions.

Senator **Durenberger**. Mr. Sherman.

STATEMENT OF CHARLES R. SHERMAN, SENIOR CONSULTANT, E.I. DU PONT DE NEMOURS & CO.

Mr. **Sherman**. Mr. Chairman, members of the staff, I have submitted a written statement and a CMA brochure that I would like made part of the record.

My name is Charles Sherman and I am a senior consultant in Du Pont's Engineering Department. I am a registered professional geologist and have worked on wells of various types for over 20 years. My entire 15-year career with Du Pont has been associated with Du Pont's various deep well systems.

My testimony this afternoon will focus on section 9(a) of S. 2649, which proposes a new section 1427 to part C of the Safe Drinking Water Act. This proposed section 1427 concerns and troubles Du Pont because it would require EPA, within 18 months, to revise its regulations to require the monitoring of underground drinking water sources down gradient from all class I injection wells.

With over 30 plus years of experience operating deep wells, we believe the proposed mandatory monitoring requirement for all class I injection wells is an overly burdensome requirement, and one which is not justified based on technical and economic considerations. Du Pont believes the proposed monitoring requirement is unnecessary because there currently exist more effective methods to accomplish the ground water protection objectives apparently envisioned by this proposed requirement. These methods have been used by Du Pont and others for decades, and are in fact required by the UIC regulations.

Pages 8 and 9 of the CMA brochure attached to my testimony entitled "Deep Well Disposal—An Option for Responsible Management of Chemical Wastes" provide schematic illustrations of the construction of a deep disposal well.

EPA's underground injection control regulations impose stringent construction and operating standards and require extensive monitoring for deep well disposal operations. Monitoring of deep well installations provides continuous performance data on the well operation and the condition of its components. Typical monitoring parameters include injection rates, injection pressures, and annular fluid pressure. In addition, analyses of the injected waste are obtained periodically. Properly operated deep wells are regularly inspected using instrumentation designed to detect problems before they become unmanageable and serious.

Monitoring of the annulus pressure enables the operator to determine if there are problems with the integrity of the various casings, injection tubing or bottom seal of the well. Detection of pressure differences outside of the normal operating range will indicate a potential problem leak.

Du Pont believes that monitoring of the injection formation is also best accomplished by monitoring the injection well system. Because injection wells operate over a fairly narrow pressure range for any specific well, changes in the normal pressures are indicators of potential problems.

There are four general cases encountered in the underground injection of industrial wastes, and a fifth case which Du Pont believes presents a situation of special concern. The following descriptions of the waste/geological structure combinations will elaborate on Du Pont's position that only in very specific and unique cases are monitoring wells necessary.

In case one, there is high density fluid-tight confining zone. When high density fluids, compared to the natural formation fluids, are injected, the injected waste will naturally migrate toward the lowest levels of the injection or disposal formation. The fact that the waste sinks to the bottom of the formation, combined with tight or consolidated confining zones, provides adequate assurance that the waste or formation fluids will not migrate upward toward a potential underground source of drinking water.

Case two, where there is high density fluid-suspected fractures in confining zones. As in the first case, if the wastes being injected have a high density relative to the formation fluids, the wastes will naturally migrate toward the bottom of the formation. Therefore, because the lighter formation fluids override the dense injection fluid, migration of wastes upward through possible fractures into a potential USDW is not a concern.

The major concern is that as the formation fills up, the overriding formation fluids will migrate through the possible fractures in the confining zones. Due to the extensive geological and hydrological studies initially performed, the presence of possible fractures would result in permit limitations on injection pressures. By limiting the injection pressures, when the formation becomes full and potential for upward migration of formation fluids is real, the injection pressures will increase beyond the permitted limit and the well will be shut down. Once injection ceases, the upward driving force on the formation fluids will be relieved, the fluids will remain in the formation and will not migrate toward potential USDW's.

In a third case where low density fluid-tight confining zones. In this case, even though the lighter wastes will override the more dense formation fluids, the tight and consolidated confining zone will prevent any upward migration of the waste.

In the fourth case where low density fluid-suspected fractures in the confining zone. In this case, installation of monitoring wells to help determine if the waste is migrating upward may be appropriate. The lighter wastes will override the formation fluids and as the formation fills up, will be pushed up against the confining zones. The concern is that waste will migrate upward along fracture patterns to the next highest aquifer.

Based on the initial geological and hydrological studies, limitations would be placed on the injection pressure. In addition, based on a case-by-case analysis, the regulatory agency may require monitoring wells to detect potential upward migration of the low density waste. Du Pont believes that if such monitoring wells are deemed necessary, they should be located in the next aquifer above the confining zone, even if that aquifer is not a potential USDW. Such location of the monitoring well would provide an early warning for possible contamination. Monitoring wells should not, however, be located in the confining zones to minimize breaching of these zones and not create avenues for migration.

A fifth case is injection in close proximity to USDW. Du Pont believes that monitoring wells may also be appropriate where waste injection occurs in relative close proximity to the lowermost USDW. Specifically, if wastes are injected into disposal formations within 300 feet of the lowermost USDW, monitoring wells may be an appropriate requirement.

In summary, Du Pont believes that there are only a few instances where specific monitoring wells are technically appropriate. Such occasions exist where: One, the injection fluid is a low density fluid and fractures are suspected in the confining zones, or two, where the disposal formation is within close proximity of the lowermost USDW. In such cases, a monitoring well will help determine if the injection fluid or even lighter formation fluids are migrating upward toward a potentially usable USDW. The actual requirement for a monitoring well, however, depends on many site-specific variables and should be left to the discretion of the appropriate regulatory agency. EPA and the States managing the UIC program already have the authority to require monitoring wells when necessary. Monitoring wells should not be a blanket requirement for all class I underground injection well systems because such a requirement would not be technically or economically justified.

This concludes my prepared statement. At this point I would like to extend an invitation to the subcommittee and its staff to visit one of Du Pont's sites where we use underground injection wells. I would be happy to answer any questions you may have.

Senator **Durenberger**. Thank you all very much. We have to vacate the room in about 20 minutes. If I don't get to ask all the questions I have for you, we will submit questions to you in writing.

Mr. Lehnen, you indicate in your testimony that productive intervals above confining beds overlaying the injection zone are identified for monitoring and the purpose of monitoring them is to detect the vertical migration if that should occur.

Would you describe for us the means by which such migration could occur and what type of migration would not be detected by the annulus or cement-casing monitoring methods?

Mr. **Lehnen**. The question is, Would I describe what kind of monitoring would indicate that migration has occurred?

Senator DURENBERGER. First the means by which that could occur and then what type of migration could not be detected, if any, by the annulus or cement-casing monitoring methods.

Mr. LEHNEN. The forces that would cause the migration of injected fluid in Florida's case are boyancy and injection pressure. Typically, a sanitary effluent with a density close to fresh water is injected into salt water, a higher density fluid, so there is bouyancy of the fresh water on the saltwater which restricts the injected fluid to the top of the injection zone and up against the base of the confining bed.

The other force is the injection pressure itself which in Florida's case is usually very low due to the high permeability of the dolomites that we inject into. The injection pressure is highest within the vicinity of the injection wells. Those two forces act to drive the effluent or the injected fluid vertically against the bottom of the confining bed.

If the injected fluid were to breach the confining beds and reach a monitoring zone in a monitoring well, that zone is typically monitored for water level and periodically monitored for water quality. The earliest detection would be an invasion of that zone by the lighter injected fluid and it would therefore, probably show up as a rise in water level as these zones generally have an artisian pressure or water level above the ground surface. By continuously monitoring that, you would be able to detect a water density change in that monitoring interval as the lighter fluid invaded it.

The other mechanism will be water quality. We generally monitor the water quality in the injection zone once a month for key chemical parameters depending on the injected fluid. If the injected fluid were to breach the confining beds and invade a monitoring interval, one or all of those key chemical parameters would change from native background levels in the monitoring intervals.

By those two means we would detect migration of injected fluid.

Senator DURENBERGER. The other part of the question is, Is there any migration that you are not going to detect?

Mr. LEHNEN. I don't believe so because if the effluent or the waste water is migrating and you monitor with a monitoring well for key chemical parameters, you should be able to detect that fluid if it invades a monitoring interval. On the other hand, annulus monitoring in the injection well will detect leaks in the injection were casing only and 36 will not tell you anything about the migration of the injected fluid in the injection zone or into an underground source of drinking water.

Senator DURENBERGER. You mentioned that aquifers containing potable water may exist downgradient from an injection well site, but this is not a concern in Florida where monitoring is done close to the well bore. This would suggest that you do not expect dissolution channels or fracture or faulting planes to serve as pathways away from the injection zone. Am I correct?

Mr. LEHNEN. You are correct. In Florida, the geology of the State is very homogeneous, a layer cake effect with very few significant fractures in the formations so vertical pathways that would breach the confining beds either near the well site or down gradient of the well site are very unlikely. That is why our greatest concern is within the immediate vicinity of the well where the forces of bouyancy are the greatest. As the effluent migrates horizontally away from the injection well, a tremendous amount of mixing of the injected fluid and native saltwater very rapidly occurs in the permeable formation. The bouyance differential rapidly diminishes as it moves away from the well bore and therefore the vertical driving force diminishes with distance

Senator DURENBURGER. I have never taken anyone up on the invitation to go out and look at one of those things. I don't know what the monitoring process looks like. I get the impression it is like the control room for nuke generating plants, it has files and gauges checking pressures. I assume that is the wrong impression. Maybe you can tell me briefly, describe the pressure monitoring and the other kind of monitoring process that goes on. Is it a 24-hour-a-day operation or periodic? Give us some idea what it is all about.

Mr. LEHNEN. I will be glad to. If you can turn to my written statement, page 15, figure 3, and page 16, figure 4, those drawings are a cross-section of a typical monitoring well and a diagrammatic representation of a monitoring well head. Typically, a system will have a multi-zone monitor well of which in Florida's case all will have a natural artesian pressure or a water level above ground surface. Therefore the pressure in those zones can be monitored by way of pressure recorders and pressure gauges.

A typical system will have a circular chart pressure recorder located at the well head that continuously monitors the water level or the well pressure in each monitoring zone. Those charts are changed daily or once a week, with periodic maintenance and review of those charts by the operating personnel.

Senator DURENBERGER. Is somebody on hand?

Mr. LEHNEN. These wells are typically located at waste water plant sites so there are operating personnel available 24 hours a day on most of the system.

Senator DURENBERGER. I get the impression nothing ever happens.

Mr. LEHNEN. That is true, other than normal pumping equipment breakdowns.

Senator DURENBERGER. You have no experience with failure.

Mr. LEHNEN. We attribute the fact that no serious failures have occurred at facilities constructed under current regulations to the stringent design, construction, and monitoring standards.

Senator DURENBERGER. Dr. Pirages, you have posed some interesting questions concerning the relationship between increased monitoring and well design, construction and installation standards.

I am going to move on from that last question.

I am curious, though, how additional requirements for monitoring could have a negative effect on the safety of deep wells. One would like to assume well technology standards are uniform and state of the art and therefore unaffected by additional monitoring.

Could you elaborate on your view of this interrelationship?

Dr. PIRAGES. I will try to elaborate on that.

As I understand it, there could be a possibility, depending on where you are monitoring, of penetrating the reservoir. If you do penetrate the reservoir, you would then be making a manmade pathway for fluid to come out of the reservoir into the overhead aquifers. I think this occurs very infrequently but the possibilities exist.

Senator **Durenberger**. In your testimony, you describe analysis, pretreatment, and monitoring of waste fluid to determine and ensure compatibility with construction materials, well casing, and the geological formation.

Are permissible concentrations for chemicals, found in the injection fluid, which might be corrosive specified in the UIC permit?

Dr. **Pirages**. I don't think so. I think it depends on the kind of construction materials being used. Each permitted facility would have particular allowable concentrations that are suitable for that facility. There are concentrations, I think, required in terms of the water standards, but I will be glad to investigate this further. I don't think there are specific concentrations for the injection fluid with respect to the compatability of construction material.

Senator **Durenberger**. Does anybody else have the background to answer that question?

Mr. **Sherman**. The waste that is permitted is listed in all the components within that waste is listed and become a part of permit procedure and part of permit. The well that is finally constructed must meet the requirements of being able to contain that particular waste and, therefore, the materials of construction have to meet whatever that waste character is.

There are no limits on chemical constituents. Other than PCB, I think it is the only thing that is restricted of going down.

Senator **Durenberger**. The process of conforming the capacity, if you will, of well materials and all that sort of thing, with what is going into it, is that a process that, in most cases, the State government is in a position before a well is given a permit or State government is in the position to give a blessing of the materials that are included in the well and all the rest of the equipment that goes with it are appropriate to the kinds of injection material?

Mr. **Lehnen**. In Florida the DER regulates the design of the complete system. Before I make a permit application for a system, I must provide detailed plans and specifications of the entire pump station, instrumentation, control, surge control system, injection well, monitoring well, piping, and casing material. DER does not review just the well, but the entire system which then becomes a part of the record for the injection system report.

Senator **Durenberger**. Do you know a State in which that is not done?

Miss **Bell**. The Federal requirement gets into it by designating that wells which inject corrosive fluids must inject through a tubing and packer. The tubing can be a special material that will resist corrosion, unlike the steel casing, and then the States could be more stringent than that if they wanted to. For example, our State banned the injection of hazardous waste through class I wells last year.

Senator **Durenberger**. Dr. Pirages, you mentioned something in your statement about pretreatment and going into this issue of who is checking to make sure what goes into the well. What is the normal process to verify the accuracy of pretreatment?

Dr. **Pirages**. The pretreatment is done to maintain the equipment integrity, so the wastes do not corrode the injection tubing. It is in the interest of the operator and facility owner to collect valid data from the pretreatment process. Testing is done in most cases on site, at the facility. Recordkeeping is part of the permit requirement and the records are available for anyone to review and comment on when necessary.

Senator **Durenberger**. Bill, let me ask you a couple of questions. You mentioned Texas has in excess of 20,000 class III solution mining wells.

Are the State requirements for ground water quality restoration consistent with the amendment in S. 2649?

Mr. **Klemt**. Mr. Chairman, in Texas our class III program is a little bit different from the Federal program in that in the uranium field, you must have an aquifer exemption. The Federal program does not allow for the lifting of the aquifer exemption.

Senator **Durenberger**. Let me clarify my question. Let me read you the appropriate part of the proposed amendment that would require the restoration of ground water quality after the termination of class III operations such that underground drinking water sources in the prescribed location will not exceed natural primary drinking water regulation or any other unregulated contamination.

Mr. **Klemt**. If you are reading from the same print I am, it doesn't have a "not" in there. I think that along the line of the Texas program, an aquifer exemption can be lifted after the restoration process has been completed.

Senator **Durenberger**. You have all indicated that as a result of your stringent UIC program regulations no class I injection activity under the Department's jurisdiction has contaminated either fresh ground or surface water.

How would one know if such contamination had occurred without monitoring since the toxics would be dilute enough that they would not be apparent in some cases?

Mr. **Klemt**. Well, I would go back to the annulus monitoring system. There are two parts to this. If there is no pressure differences or no indication of failure, then your casing must be tight and your tubing and packer must be tight. But also with that goes the periodic mechanical integrity testing and that is broken into two parts, in Texas where first, the interior of the casing is usually pressure tested, the testings are such that the interior of the casing is looked at to determine if it is sound. Then the second part of the test is to determine if there is fluid migration in back of the casing and that is usually done through geophysical logging methods.

So, in addition to the 24-hour annulus monitoring, we have mechanical integrity testing which would hopefully indicate there is no fluid movement behind the casing and your casing is tight.

Senator **Durenberger**. Can there be leaks outside of the well that can occur that would not be detected by within well monitoring?

Mr. **Klemt**. In my opinion, I don't think so. Once your system is indicating that it is tight, the only way you could get a leak would be for it to migrate from the injection interval. If you have done your homework, if you have done your geohydrology and you make sure there are multiple confining beds and that you are deep, the geohydrology is such that movements are very very slow, they are generally horizontal and there is just no way that it can get back to the surface. There is no way that you would even be able to predict that.

Senator DURENBERGER. Let me ask you a question about unplugged oil and gas wells in Texas. There is evidence that in some cases of contamination from injection, that unplugged oil and gas wells have provided a pathway for migration. The hazard posed by unplugged wells in areas of waste injection is particularly threatening because the location of many of the wells is unknown. There are estimates of as many as 1 million unplugged, unlocated wells.

Do you have any estimate of the nature of that problem in this country? Have you found some magic way in Texas to avoid the problem?

Mr. KLEMT. The first part of the question with regard to magnitude, they are not a great many of these wells that we do not have records on. I would say in a typical waste disposal application, there may be one or two wells where we do not have the plugging records available. So that any injection proposed that is allowed to move forward would be engineered so that an artificial penetration if it were unplugged would not be a problem. So I would guess that in a year's time—we are permitting all our wells, I probably see 30 or 40 applications a year. So, out of that, there may be 30 or 40 artificial penetrations on which the records are doubtful.

Senator DURENBERGER. Let me ask a question of both of you who are State program administrators.

I would like both of you to explain the discrepancy in your views on monitoring. That is, why does Florida find it beneficial to require monitoring even with its stable geology and Texas has the position that it is not sufficiently effective to provide additional security benefits?

Miss BELL. Just from what I heard from his testimony, I think the difference is the number of salt water aquifers between their drinking water sources and their injection zones. Apparently, there is quite a few. As you can tell, our injection zone is relatively near our underground sources of drinking water, plus, we are very protective of our underground sources of drinking water because that is where we get 92 percent of our drinking water. We view both the fresh water and salt water portions of the aquifer system as a public resource and it is being developed and exploited and we need to manage that. One way we can do that is through monitor wells. Along the southeast coast of Florida we are getting clusters of large volumes of sewage being injected in the wells that don't have annuluses so that means we can't use the traditional methods of testing the well integrity. We are very conservative in saying if we can't do it this way, let's put in a monitor well to make sure.

In Dade County alone we already permitted 150 million gallons a day to go into the injection zone, figure 1, and it is becoming a very popular method of disposal because it always turns out to be the most cost effective.

Senator DURENBERGER. Mr. Klemt, you want to respond to the differences between Texas and Florida?

Mr. KLEMT. I will try to, Mr. Chairman.

In Texas most of our waste disposal wells are located on the gulf coast. The gulf coast sediments are very deep sediments and we have a series of alternating sands and clays and shales. So what you have is a fresh water aquifer and we call it the gulf coast aquifer. That probably is on the average of around 1,000 feet below land surface. So below that, if you are injecting at, say, 6,000 feet, you have about 5,000 feet of gulf coast sediment between you and the base of usable quality groundwater and those sediments are probably 50 percent clay or shale. So you just have multiple barriers.

Now, in west Texas, we do have limestone reservoirs but they are effectively sealed off by multiple confining beds and they are fairly deep.

So, we just feel like in Texas, that we are fortunate, we do have good geohydrology and if you utilize that, then there is no need for these fresh water monitoring wells because, quite frankly, if I thought there were a need for one, I don't believe that they would get the permit.

Senator **Durenberger**. We are going to have to conclude. I have one question for Mr. Sherman.

You stressed the need for flexibility in monitoring requirements and you have a couple of cases, listed in your testimony, where monitoring outside of the well might be appropriate and in other cases where it would not be.

One of the notions that occurred to us is that we could maintain flexibility in a monitoring requirement by placing some burden on the operator to show that potentially threatening conditions do not exist.

Would it be your view that State authorities are now doing just that, putting burdens of proof on operators and therefore no Federal statutory requirement is necessary?

Mr. **Sherman**. The States always have placed the burden of proof upon the applicant, a very high burden of proof. The Federal UIC regulations place a very high burden of proof upon the applicant. Normally, if there is a doubt in the regulatory agency's mind, they don't issue a permit. I described several conditions under which if there are tight confining zones there should not be a loss of fluid. It depends upon the density of the waste whether you might have a migration component to that waste injection or the formation fluid. And it is suggested under certain conditions, where you have light density waste, that you may need a monitor well; or, where you have a situation that the lowermost underground drinking water is very close to the point of injection you might want to look at monitor wells.

These are site-specific and unusual situations. The fact is that the geology across the United States varies considerably so what may be appropriate for Florida or Texas or Michigan or Ohio varies. To legislate, a requirement, we feel is not necessary because the requirement for monitor wells or a provision for monitor wells are already in the UIC regulations and any director of a State program or Federal program has the option to impose the use of monitor wells if he sees fit.

Senator **Durenberger**. Let me thank you all for taking the time to be here today. This is very helpful addition to our last hearing and as I indicated earlier, your full statements and any other evidence that may be appropriate will be considered to complete the record, together with responses to whatever questions we will be forwarding to you. Thank you.

[Whereupon, at 4:40 p.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.]

[Statements and other material supplied for the record follow:]

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STATEMENT BY

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Before

Subcommittee on Toxic Substances and Environmental Oversight

Committee on Environment and Public Works
United States Senate
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In the Southeast, CH2M HILL was formerly known as Black, Crow and Eidsness.

INTRODUCTION

Mr. Chairman and Members of the Subcommittee, thank you for inviting me here today. My name is Jeffrey D. Lehnen, and I am a hydrogeologist with the engineering consulting firm of CH2M HILL in Gainesville, Florida. I have worked in the fields of groundwater hydrology and well design for 7 years with CH2M HILL, and have been associated with the design of 14 Class I injection wells for eight injection systems. Of these wells, 11 are operating successfully and three are yet to be constructed. A personal resume is attached for reference purposes.

CH2M HILL is a national consulting firm with over 2,100 employees in 30 offices throughout the United States, and is the seventh largest environmental consulting firm in the country. Our experience with injection well systems in the state of Florida spans 18 years. CH2M HILL is also currently active in hazardous waste investigations and cleanup for the Superfund program and other clients, water resources and environmental studies, water supply development, water and wastewater treatment, as well as numerous public works projects throughout the country. Several brochures are attached which summarize the diverse environmental activities in which CH2M HILL is currently working.

DEEP WELL INJECTION IN FLORIDA

Deep well injection of sanitary and industrial wastewaters through Class I injection wells began in Florida in 1963, with a system installed at a synthetic fiber manufacturing plant near Pensacola, Florida. Since that time, 17 injection systems have been completed and 20 more are in the design phase or are proposed. The rapid development of Class I injection as an environmentally sound disposal alternative has come about as a result of the unique hydrogeology of the state, particularly the occurrence of a highly permeable rock formation containing saltwater throughout large portions of the state. It also reflects continually more restrictive regulations governing surface water discharge, and the cost-effectiveness of injection relative to other available forms of disposal. As regulatory efforts and philosophy increasingly restrict wastewater discharge, the disposal options available to a municipality or industry narrow. Common disposal alternatives available in Florida include land application; percolation ponds; advanced treatment to drinking water standards with reuse; river, lake, or ocean outfalls; and underground injection.

Land application and percolation ponds are reasonably cost-effective for small wastewater volumes; however, the high cost of open land or long distance transmission necessary to reach open land make these alternatives less attractive for large volume systems and systems located in urbanized areas. River and ocean outfalls can be cost-effective; however, where other alternatives are available, surface discharge is discouraged. Reuse is very expensive and has not yet gained public acceptance. Underground injection has proven to be a reasonably priced alternative when the required hydrogeologic conditions are present. This disposal technique has enabled many municipalities and industries to solve difficult wastewater disposal problems in an environmentally sound way.

CLASS I STANDARDS AND MONITORING

In Florida, there are two common uses of Class I injection wells, one is for industrial wastewater disposal and the other for sanitary municipal effluent disposal. A third use, for reverse osmosis brine disposal, is just now being developed. Regardless of the particular use of an injection system, the same construction, testing, and monitoring requirements apply to both the injection well and the monitoring wells associated with the system. Stringent design, construction, and testing requirements are followed throughout the construction of the injection system, the most important of which are summarized as follows:

- Research of the hydrogeology of the area to determine the depth of highly productive zones containing saltwater; depth of confining beds and their areal extent.

- Construction of an impermeable curbed pad around the well site to accommodate the drilling equipment and to contain saltwater spills and formation cuttings.

- Multiple-casing well design with 5-inch thick surrounding annular spaces to allow for cementing of the casings and isolation of zones with different water qualities and pressures.

- Staged construction with blowout control equipment, and drilling of an exploratory hole in which hydrogeologic data are confirmed through formation and water quality sampling and geophysical logging.

- Vertical alignment and directional control of all drilled holes to within 1 degree to ensure that the boreholes and casings are straight and concentric.

- Establishment of a groundwater monitoring system to regularly check the quality of the overlying freshwater aquifers during construction.

- Confirmation of the effectiveness of the confining beds overlying the receiving aquifer through the use of in-situ hydraulic tests, rock core permeability analysis, density geophysical logging, and other methods.

- Confirmation of the integrity of the completed system by casing pressure testing, cement bond geophysical logging, underwater television inspection of the final string of casing, and final pumping and injection testing.

These design and construction standards result in conservatively designed wells that reliably protect underground sources of drinking water (USDW) from contamination.

Monitoring of the overlying aquifers above the injection zone is accomplished with one or more monitoring wells usually located near the injection well. The monitoring wells are constructed to the same standards as the injection wells and are usually located nearby because the direction of migration of the injected effluent of greatest concern in most cases is vertically into overlying USDW aquifers. During the drilling of the wells, productive intervals above the confining beds overlaying the injection zone are identified for monitoring. These zones may or may not have water quality less than 10,000 mg/L total dissolved solids depending on the conditions at the site, but the purpose of monitoring them is to detect the vertical migration of effluent through the confining beds if that should occur.

The principal vertical driving force is the buoyancy of the injected wastewater which has a density close to that of freshwater. The purpose of locating the monitoring wells near the injection wells is that the effects of this buoyancy are greatest near the injection well borehole. As the injected effluent migrates horizontally through the injection zone, it mixes with the native saltwater thereby reducing and eventually eliminating the density differential between the two waters and therefore the vertical driving force at the base of the confining beds.

This, coupled with the fact that the hydraulic pressure in the formation is highest near the injection well bore during injection, makes the potential for contamination of overlaying aquifers highest near the injection well. Therefore, monitoring the overlying aquifers near the injection site affords the earliest possible detection of contamination, should that occur.

"Downgradient" in the typical injection system in Florida is usually the Gulf of Mexico or the Atlantic Ocean and only saltwater is contained in the injection zone. Aquifers containing potable water or potential drinking water (TDS less than 10,000 mg/L) do occur in overlying formations downgradient of most systems. Due to the previously mentioned buoyancy and hydraulic forces and the mixing of the effluent and native saltwater, monitoring of these overlying aquifers is best done near the injection site.

TYPICAL CLASS I INJECTION SYSTEM

For the purpose of illustrating the construction and operation of a Class I injection system and its various components, we offer the following detailed description of a municipal effluent injection system. This system can be considered typical of current design standards for both sanitary effluent and industrial wastewater systems. This system was constructed in 1983 for a private utility in Port St. Lucie on the southeast coast of Florida, and is currently operating successfully.

The system includes an effluent pumping station located in the last of a chain of polishing ponds, a surge protection system connected to the injection piping downstream of the injection pumps, an injection well, Floridan Aquifer monitoring well, shallow aquifer monitoring well, and associated monitoring instrumentation and controls.

The effluent pumping station includes two vertical turbine pumps which are controlled via water level floats which are set to maintain the pond level within an elevation range. The effluent is pumped out of the pond into the injection piping to the injection well, where it discharges into a highly fractured dolomite from 3,100 to 3,400 feet in depth, known as the "Boulder Zone." Due to the low permeability of the overlying formations, the effluent is confined to that depth where it mixes with the native saltwater, is diluted, and migrates horizontally toward the ocean.

A hydraulic surge tank is connected to the injection piping just downstream of the pumps to provide a hydraulic cushion to dampen the effects of water hammer on the piping and well casing, thereby protecting them from damage. The injection flow rate is measured by the differential pressures from a venturi tube insert which is located near the injection wellhead. The flow rate and injection pressure are continuously transmitted to and recorded by circular chart recorders located in the laboratory instrument panel.

As part of the effluent monitoring system, the pressures in the two monitoring zones in the brackish Floridan aquifer above the injection zone are continuously recorded at an instrument panel located at the monitoring wellhead. If effluent were to migrate vertically through the confining beds, that migration would be indicated in the monitoring well by (1) a pressure change in either of the two zones caused by the fresher, lower density effluent invading the native brackish water aquifer and (2) a change in water quality from background levels of key chemical parameters tested monthly.

The following is a listing of the monitoring data collected from the injection system:

Parameter	Equipment or Procedure	Frequency
Injection Flow Rate (gpm)	24-hr circular chart recorder in laboratory instrument panel	Continuous
Injection Pressure (psig)	24-hr circular chart recorder in laboratory instrument panel	Continuous
Water Quality of Injected Fluid:		
Specific Conductance	Sample at wellhead	Daily
Suspended Solids	Sample at wellhead	Daily
Temperature	Sample at wellhead	Daily
Pressure in the Lower Monitoring Zone-- 1,610-1,663 ft (ft of water)	24-hr circular chart recorder in wellhead panel	Continuous
Pressure in the Upper Monitoring Zone-- 900-1,268 ft (feet of water)	24-hr circular chart recorder in wellhead panel	Continuous
Water Quality of the Two Monitoring Zones: Specific Conductance Chloride Concentration Temperature Fecal Coliform BOD_5 Nitrogen	Sample after flowing zones into pond #6 via 2-inch line for 1.5 casing volumes	Monthly
Specific Injectivity of Injection Well	Inject @ 2,800 gpm; measure pressure	Monthly

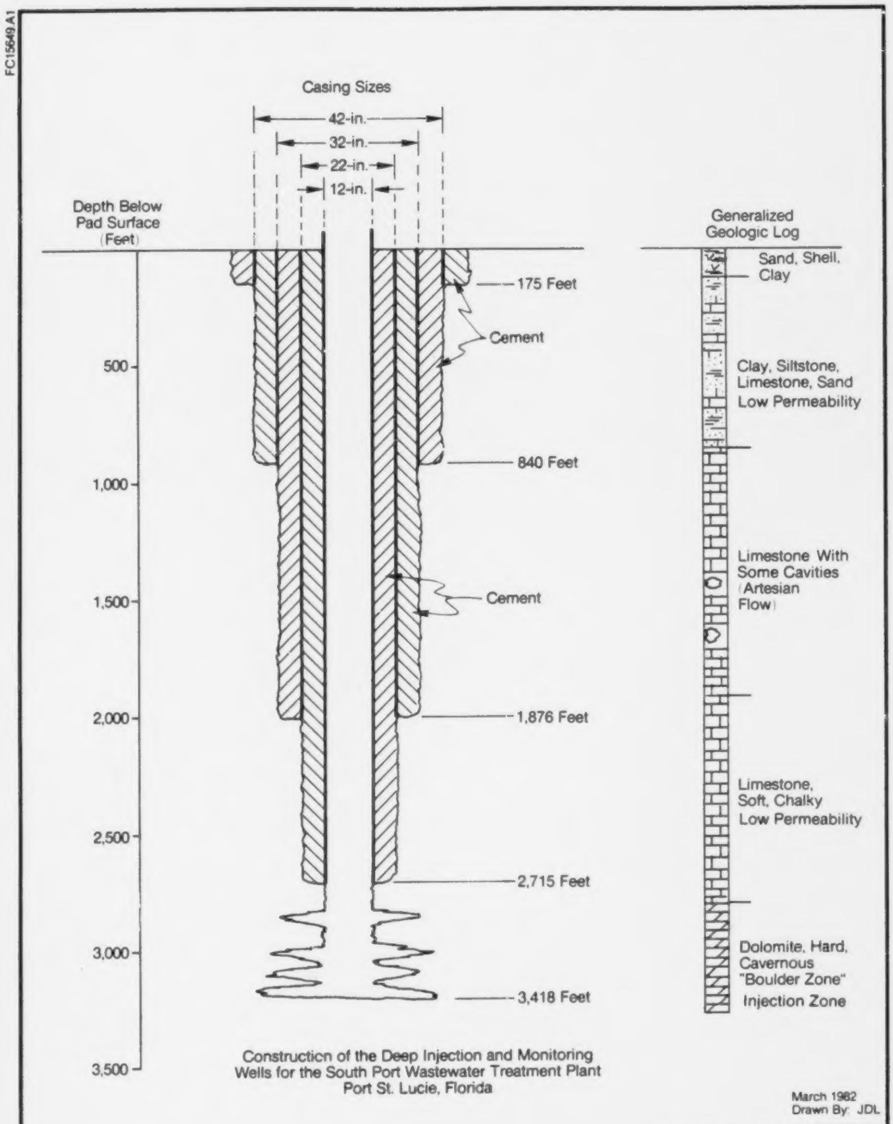
INJECTION WELL DESCRIPTION

The injection and monitoring wells are located on a concrete pad at one end of the wastewater treatment plantsite. Figure 1 is a diagram of the injection well showing casing sizes and depths. The injection wellhead is detailed in Figure 2.

The injection well is constructed of four concentric steel casings designed to protect the subsurface environment from contamination by the injected effluent. The freshwater aquifer is protected by the four casings which are fully cemented from land surface to their bottoms. The brackish water of the Floridan Aquifer is protected by two of the casings, and the confining beds between the brackish water and the injection zone are protected by a 12-inch black steel final casing string (0.500 inch wall thickness) to 2,715 feet in depth.

The injection zone, known as the Boulder Zone, extends from 3,120 to 3,418 feet in depth in this area and is separated from the brackish water of the Floridan Aquifer by 1,400 feet of dense limestone confining beds. The natural water quality in the injection zone is similar to that of seawater.

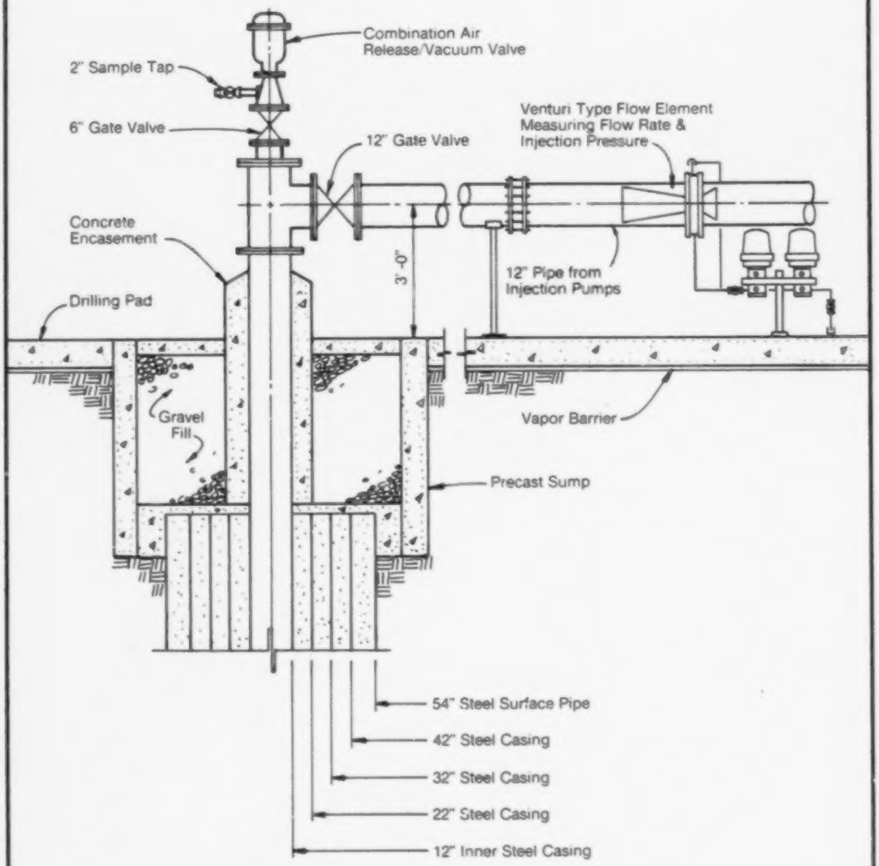
The capacity of the injection well is 4 million gallons per day (mgd) with the two injection pumps operating. The hydraulic testing of the injection well demonstrated that


FC15649.A1
Casing Sizes
42-in.
32-in.
22-in.
12-in.
Depth Below
Pad Surface
(Feet)
500
1,000
1,500
2,000
2,500
3,000
3,500
175 Feet
Cement
840 Feet
Cement
1,876 Feet
2,715 Feet
3,418 Feet
Generalized
Geologic Log
Sand, Shell,
Clay
Clay, Siltstone,
Limestone, Sand
Low Permeability
Limestone With
Some Cavities
(Artesian
Flow)
Limestone,
Soft, Chalky
Low Permeability
Dolomite, Hard,
Cavernous
"Boulder Zone"
Injection Zone
Construction of the Deep Injection and Monitoring
Wells for the South Port Wastewater Treatment Plant
Port St. Lucie, Florida

March 1982
Drawn By: JDL

FIGURE NO. 1.
Injection well diagram for the South Port WWTP.

FC15649.A8


Combination Air Release/Vacuum Valve
2" Sample Tap
6" Gate Valve
12" Gate Valve
Venturi Type Flow Element Measuring Flow Rate & Injection Pressure
Concrete Encasement
3'-0"
12" Pipe from Injection Pumps
Drilling Pad
Gravel Fill
Vapor Barrier
Precast Sump
54" Steel Surface Pipe
42" Steel Casing
32" Steel Casing
22" Steel Casing
12" Inner Steel Casing

INJECTION WELLHEAD DETAIL

Not to Scale

October 1983

FIGURE NO. 2.
Injection Wellhead Detail for the
South Port WWTP, Port St. Lucie, Florida

CH2M HILL

the injection pressure at the wellhead is attributable almost entirely to friction losses in the well and bouyancy of the less dense injected fluid on the native saltwater. The effluent floats on the denser saltwater near the top of the injection zone and migrates radially in a thin lens away from the well toward the Atlantic Ocean.

Due to the nature of the effluent, no chemical or physical change is expected to occur in the injection zone as a result of injection.

MONITORING WELL DESCRIPTION

The Floridan Aquifer is monitored by means of a two-zone monitoring well located 80 feet east of the injection well. The monitoring well is located in the presumed downgradient direction (east). However, the regional gradient in the Boulder Zone is so small that its direction need not be considered in locating a monitoring well this close to an injection well.

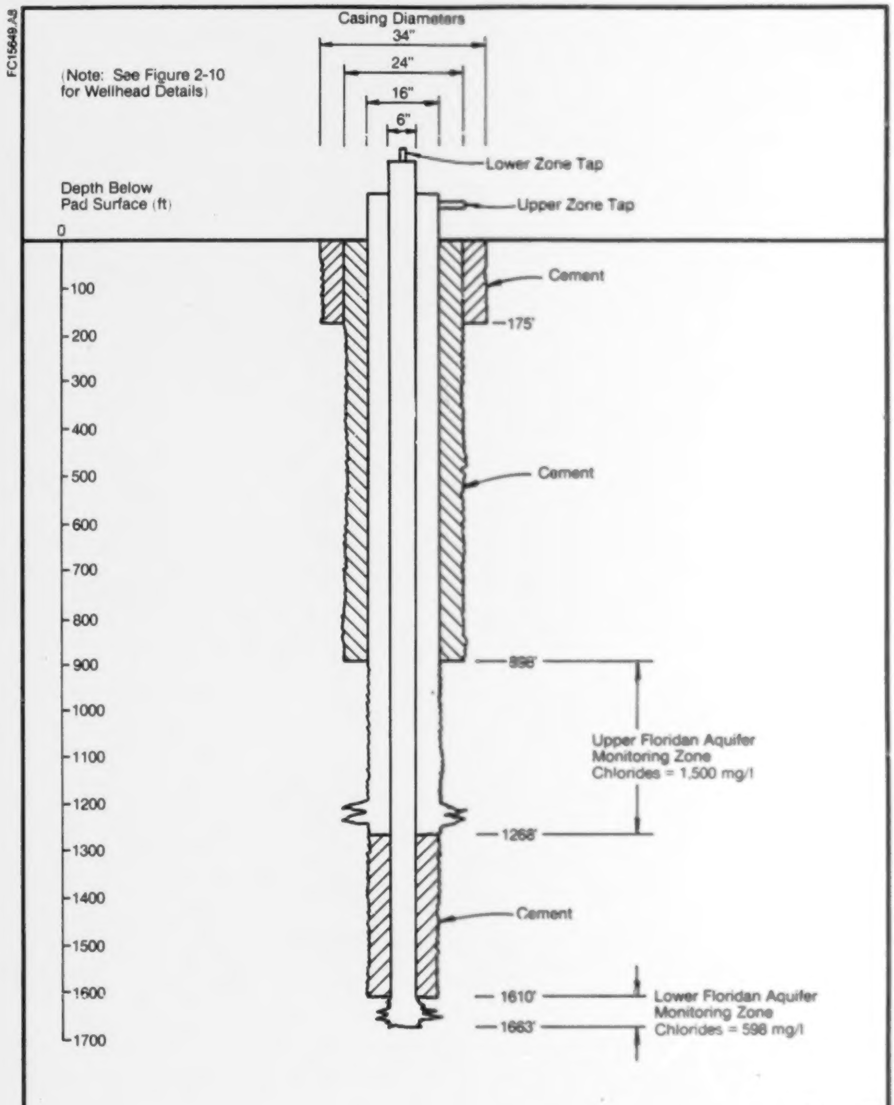
The upper monitoring zone, accessed through the annulus between the 16- and 6-inch casings, is open to the upper Floridan Aquifer from 898 to 1,268 feet. The main production interval of the aquifer occurs from 1,200 to 1,268 feet in a light brown dolomite and dolomitic limestone in the Avon Park formation. This zone has an artesian head of approximately 37 feet of water above the concrete pad and flows at a rate of about 225 gpm through the 2-inch valve on the 16-inch casing.

The lower monitoring zone is the open hole below the 6-inch casing and extends from 1,610 feet to 1,663 feet in depth. This interval is a tan and gray limestone and dolomite which may be the formational contact between the Avon Park and underlying Lake City Limestone. The lower zone has an artesian head of approximately 40 feet of water above the concrete pad. This lower Floridan Aquifer monitoring zone flows at a rate of about 125 gpm through the 2-inch valve on top of the 6-inch casing.

Figure 3 is a diagram of the monitoring well construction details.

MONITORING WELL ARTESIAN PRESSURE AND WATER QUALITY MONITORING

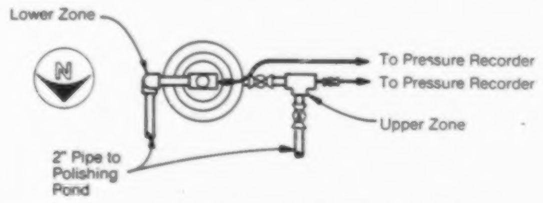
Continuous pressure monitoring of the two monitoring intervals is provided by two circular chart pressure recorders, one connected to each zone. These recorders are housed in a cabinet at the monitoring well, and have 24-hour charts. Figure 4 shows the monitoring wellhead details and instrumentation. Figure 5 shows the instruments at the monitoring wellhead and in the Laboratory Building.


FC15649.A8
Casing Diameters
34"
24"
16"
6"
(Note: See Figure 2-10 for Wellhead Details)
Lower Zone Tap
Upper Zone Tap
Depth Below Pad Surface (ft)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
Cement
175'
Cement
898'
Upper Floridan Aquifer Monitoring Zone Chlorides = 1,500 mg/l
1268'
Cement
1610'
1663'
Lower Floridan Aquifer Monitoring Zone Chlorides = 598 mg/l

October 1983

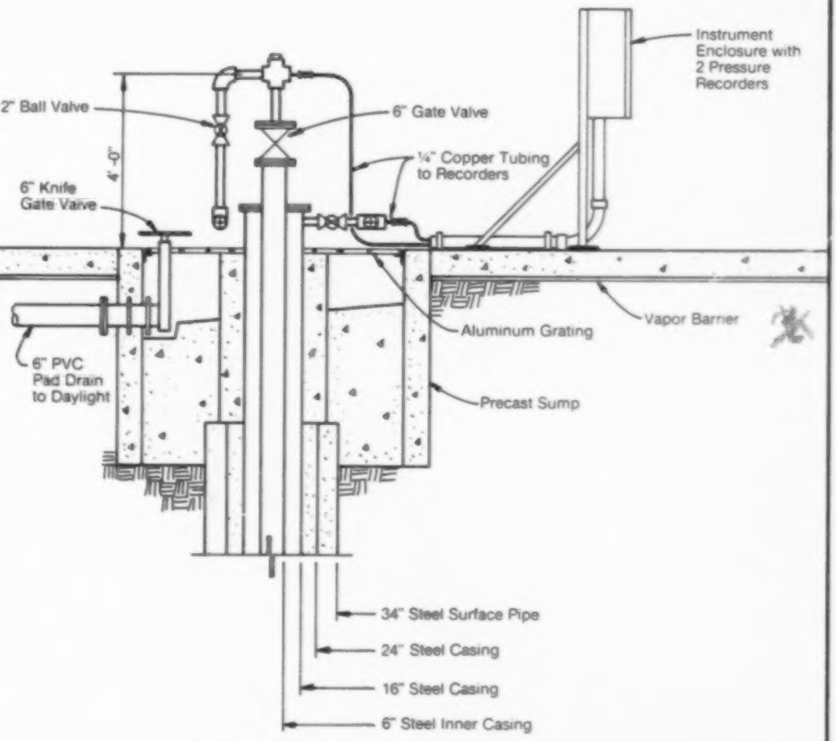
FIGURE NO. 3.
Monitoring Well Detail for the South Port WWTP, Port St. Lucie, Florida

FC15649.A8


Lower Zone
N
To Pressure Recorder
To Pressure Recorder
Upper Zone
2" Pipe to Polishing Pond

PLAN VIEW OF SAMPLING PIPE

Not to Scale


Instrument Enclosure with 2 Pressure Recorders
2" Ball Valve
6" Gate Valve
4'-0"
¼" Copper Tubing to Recorders
6" Knife Gate Valve
Aluminum Grating
Vapor Barrier
6" PVC Pad Drain to Daylight
Precast Sump
34" Steel Surface Pipe
24" Steel Casing
16" Steel Casing
6" Steel Inner Casing

MONITORING WELLHEAD DETAIL

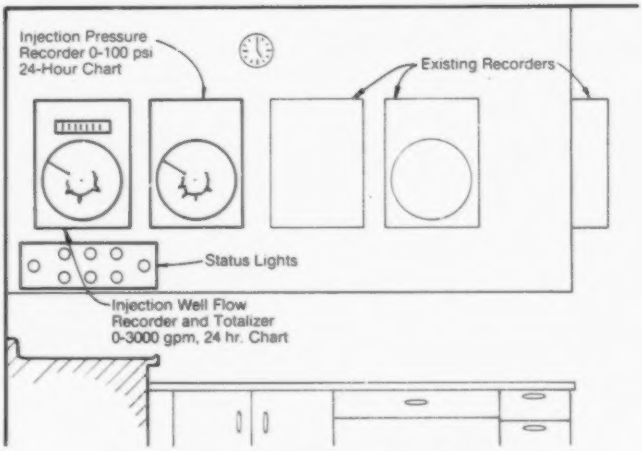
Not to Scale

October 1983

FIGURE NO. 4

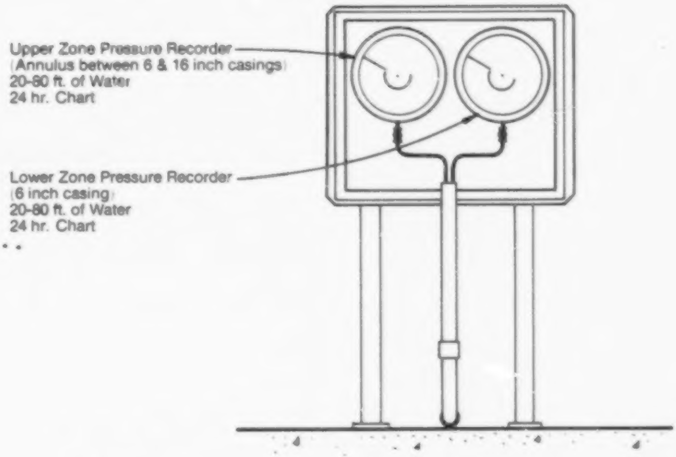
Monitoring Wellhead Detail for the
South Port WWTP, Port St. Lucie, Florida

FC15649.A8


Injection Pressure
Recorder 0-100 psi
24-Hour Chart
Existing Recorders
Status Lights
Injection Well Flow
Recorder and Totalizer
0-3000 gpm, 24 hr. Chart

INSTRUMENT PANEL—LAB BUILDING

Not to Scale


Upper Zone Pressure Recorder
(Annulus between 6 & 16 inch casings)
20-80 ft. of Water
24 hr. Chart
Lower Zone Pressure Recorder
(6 inch casing)
20-80 ft. of Water
24 hr. Chart

INSTRUMENT PANEL—MONITORING WELL

Not to Scale

October 1983

FIGURE NO. 5

Injection and Monitoring Well Instrumentation
Deep Injection and Monitoring Wells
South Port WWTP, Port St. Lucie, Florida

CH2M HILL

Every month water quality samples are collected from the two monitoring zones in the monitoring well and analyzed for key chemical parameters. These sample parameters are compared to the pre-injection water quality in order to detect any changes caused by migration of injected effluent.

If effluent migration occurs, the monthly water samples will show a freshening trend from background brackish water chloride and specific conductance values as the freshwater injected effluent invaded the monitoring zones.

EFFLUENT FLOW RATE AND PRESSURE INSTRUMENTS

The effluent flow rate is measured with a venturi flow element located in the injection piping near the injection wellhead. A pressure differential across the venturi is measured by a flow transmitter which converts the hydraulic differential into an electric analog signal. The electric signal is received by the pressure recorder in the laboratory building. The laboratory instrument panel is shown in Figure 5.

The pressure signal from the venturi tube is also the injection pressure signal and is recorded by a pressure recorder located in the laboratory instrument panel. A pressure gauge is located at the venturi tube and is independent of the electrical pressure signal to the recorder for calibration purposes.

Both recorders in the laboratory instrument panel are electrically operated and have 24-hour, 12-inch circular charts which must be changed daily.

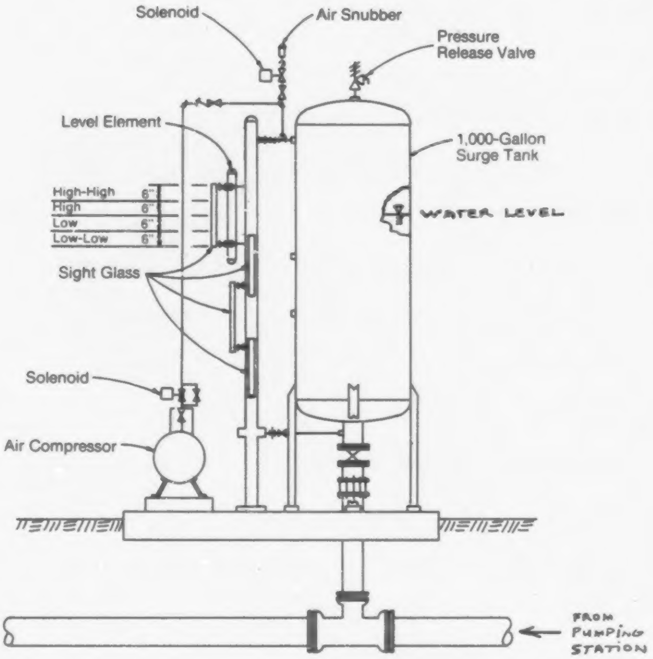
SURGE PROTECTION SYSTEM

The injection piping is connected to the 1,000-gallon surge tank downstream from the pumps. The purpose of the surge protection system is to dissipate hydraulic surges produced by starting and stopping the injection pumps. Figure 6 shows the surge protection system components.

When the pumps are stopped, the water in the piping system does not instantly come to a stop but remains in motion due to its inertia. This inertia causes a low pressure downstream of the check valves. If the velocity of the water column is high enough, water column separation can occur within an unprotected system. After the inertia is dissipated, the reversal of the water column may produce a very rapid pressure increase in the piping which can cause extensive damage. This phenomenon is known as "water hammer."

The surge tank provides a reservoir of water to fill any voids caused by the low pressure wave and prevents column separation, thereby reducing the magnitude of the surge to a safe level for the system.

FC15649.A3


Solenoid
Air Snubber
Pressure Release Valve
Level Element
1,000-Gallon Surge Tank
High-High
High
Low
Low-Low
6"
6"
6"
6"
WATER LEVEL
Sight Glass
Solenoid
Air Compressor
TO INJECTION WELL
FROM PUMPING STATION

SURGE CONTROL SYSTEM DETAIL

Not to Scale

October 1983

FIGURE NO. 6

Surge Control System Detail

South Port WWTP, Port St. Lucie, Florida

CH2M HILL

COMMENTS ON S. 2649

We welcome this legislation because it will further enhance the Safe Drinking Water Act and provide needed protection for underground sources of drinking water.

SECTION 1426

We support the prohibition of hazardous waste injection above or into a formation containing an underground source of drinking water, which is now included in S. 2649. In Florida, as in many parts of the country, many hazardous compounds that are placed anywhere in the soil profile--and certainly those placed directly into a source of drinking water--could migrate to a water supply.

It is suggested that the second sentence of this section concerning the injection of contaminated groundwater into the aquifer from which it was withdrawn should read "Injection of treated groundwater resulting from an approved cleanup, removal, or remedial action for a contaminated aquifer into the aquifer from which it was withdrawn may be allowed...."

This would clarify the intent that the groundwater to be injected has been treated to remove or reduce the contaminants to an approved level of concentration.

SECTION 1427(a)(2)

The requirement of "monitoring of underground drinking water sources downgradient from a Class I injection well" is generally beneficial. The wording, however, may be too restrictive for most cases.

In Florida, Class I injection systems typically inject effluent into a highly permeable and cavernous dolomite in which mixing and dilution of the effluent and native saltwater occur very rapidly. The vertical driving forces of bouyancy and hydraulic injection pressure acting to force the injected effluent into overlying aquifers diminishes with distance from the injection well, and therefore the likelihood of contamination of overlying aquifers occurring downgradient is very low. Since these same forces are the highest at the injection well, monitoring of overlying aquifers near the injection well provides the earliest possible means of detecting migration of injected effluent.

It is suggested that the wording of this requirement be revised to require the following: "Monitoring of underground drinking water sources at locations and in such a way that will provide the earliest possible detection of contamination of these underground drinking water sources from a Class I injection well."

Section 1427(b)

The bill as written would eliminate Section 146.4(c) of Title 40 of current regulations. We suggest that Section 146.4(c) be retained because it allows a measure of reasonable judgment to be applied by the regulating agency in determining the most beneficial and environmentally logical use of an aquifer on a case-by-case basis. Thus, agencies would be allowed the flexibility necessary to deal with the variable hydrogeologic conditions that exist throughout the country.

Section 146.4(c) states that an aquifer or portion thereof which meets the criteria for an underground source of drinking water may be exempted from that classification if the total dissolved solids (TDS) concentration of the water is between 3,000 and 10,000 mg/L and it is not reasonably expected to supply a public water system. This makes it possible to use an aquifer for Class I injection that may contain water with between 3,000 and 10,000 mg/L TDS if it is determined that there is no other beneficial use for that aquifer.

In a carbonate aquifer system such as in Florida and many parts of the country, the production of water from the aquifer is usually from discrete openings or cavities in the limestone and dolomite of the formation. These higher permeability intervals are separated by beds of relatively lower permeability resulting in a stratified aquifer instead of homogeneous, equally permeable "sponge" as in a typical sand or gravel aquifer. As a result of this stratification, water quality differences can occur in discrete producing intervals within a few feet of each other.

Typically, the injection formation of a Class I system is an aquifer made up of numerous cavities, their combined permeability allowing the formation to accept the injected flow with little hydraulic resistance. All of the cavities in the injection formation contain water with greater than 10,000 mg/L TDS. If, however, one discrete cavity at the top of the injection formation were to contain water with less than 10,000 mg/L TDS, the entire formation could not be used for Class I injection without an exemption to the greater than 10,000 mg/L TDS requirement.

If the discrete cavity could be developed as a USDW, its protection would be warranted. If, however, its yield to a well would be very low, or due to its proximity to much saltier water in the formation, its water quality would eventually degrade, it is unreasonable to protect that cavity by prohibiting use of the formation for Class I injection.

This concludes my prepared remarks on S. 2649. I thank the Subcommittee for the opportunity to testify and would be glad to answer any further questions you may have.

d.901/cml

ICWM

Institute of Chemical Waste Management

STATEMENT OF

Suellen W. Pirages, Ph.D.
Director

Institute of Chemical Waste Management

on

Amendments to the Safe Drinking Water Act

Before the

U.S. Senate
Committee on Environment and Public Works,
Subcommittee on Toxic Substances
and Environmental Oversight

June 26, 1984

An Institute of the National Solid Wastes Management Association
1120 Connecticut Avenue N.W., Suite 930, Washington, D.C. 20036 • 202/659-4613

NSWMA

Mr. Chairman and members of the Subcommittee, my name is Suellen Pirages. I am the Director of the Institute of Chemical Waste Management (ICWM). The Institute is a component of the National Solid Wastes Management Association and was formed to promote proper management of chemical and other wastes believed to be hazardous to human health and the environment. Members of the ICWM provide services for storage, treatment and disposal of hazardous wastes. Philosophically, the Institute has been a strong supporter of environmental protection and the enactment of strong, workable environmental laws and regulations. The ICWM has argued for a regulatory system that would be as uniform as possible, even when administered by various states.

The Institute supports the maximum application of treatment technologies in managing hazardous wastes. Depending on type and characteristics of a particular hazardous waste stream, a basic premise of ICWM is the full application of the following options: recycle and reuse; treatment to reduce, if not eliminate, hazardous characteristics; immobilization of wastes and treatment residues that are placed in the land. Many of our member companies incorporate deepwell injection as an important component in a strategy for effective management of hazardous wastes.

The U.S. Environmental Protection Agency's recently released report National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities Regulated Under RCRA in 1981[*] concluded that injection wells handled approximately 8.6 billion gallons of hazardous waste in 1981. This represents nearly 60% of the total amount of hazardous waste that was land disposed during that year. It is important to note that in 1981, a total of 5.7 billion gallons of waste was safely disposed by deepwell injection methods in the state of Texas alone. Although no figures are available to say with certainty, at least 90% of that total would be classified as hazardous waste. Of the estimated 170 deep wells located across the country, 95 sites are currently active in Texas. What is striking about these figures is that in Texas there have been no recorded incidents of drinking water contamination, due to operation of hazardous waste injection wells.

If operated properly, deepwell injection is a safe and successful disposal technology. The success of its use, however, is highly dependent on regional geology. For example, the Texas Gulf Coast is particularly well suited for the safe operation of deep wells. Because of extensive oil/gas drilling and production activity in this region, much is known about the geology. The presence of deep receiving reservoirs overlaid by thick confining zones make it an ideal environment for the safe, permanent isolation of hazardous waste from the biosphere. Only certain areas in the United States are suitable. The most favorable locations are generally in the north central, midwest, south central and gulf coast sections of the country.

---

[*] Westat, Inc., National Survey of Hazardous Waste Generators and Treatment, Storage and Disposal Facilities Regulated Under RCRA in 1981, reported prepared for US/EPA Office of Solid Wastes, April 1984.

Site selection for a disposal well involves evaluating many conditions. Of greatest importance is the determination that underground formations have a natural capability to contain and isolate the injected wastes. An important part of this determination is the evaluation of the history of floodplain and earthquake activity. A well would not be located in an area of geologic or climatologic instability. Also the existence of abandoned wells, mineral resources and underground sources of drinking water must be identified and evaluated.

Deepwell injection is generally suitable only for liquid wastes. In the vast majority of Class I injection wells, the receiving zone is an unconsolidated sand formation that can be readily plugged by the presence of solid particles. Therefore our member companies that operate deep wells filter out all solids larger than one micron in size prior to injection. Testing and pretreatment of each waste stream is essential for the proper operation of the deepwell injection system. By pretreatment of wastes and with extensive monitoring, this technology is capable of safely handling wastes that are too toxic for biological treatment, too low in energy value for incineration, and too dilute for landfilling.

Quality control is an essential part in operating a deep well. Prior to accepting any waste stream, it is first analyzed to determine compatibility with the construction materials in the surface piping and storage tanks, the well itself, and the receiving geological formation. The waste also must be evaluated for compatibility with other waste streams being handled at the facility. Waste streams that are corrosive, capable of generating gases, or are likely to precipitate solids once injected, must be analyzed and pretreated to an acceptable quality before injection. Such quality control is an ongoing task with each individual waste load sampled and tested.

Surface facilities at a deepwell site will vary depending on the type of wastes handled and could include neutralization tanks, storage and blending tanks, chemical treatment units, pumps and filters. Instrumentation includes continuous recording of key parameters such as injection pressures, flow rates and pH of the injected liquid. Pressure within the space between injection tubing and protective casing (called annulus pressure) is constantly maintained at a level of at least 100 pounds per square inch above injection pressure. This monitoring serves as a first line of detection for possible leakage. Protection of aquifers above the well reservoir is compounded and reinforced by surrounding the injection tubing and protective casing with three (3) separate steel casings and acid resistant cement filling in each space between casings. Any loss in annulus pressure would suggest a possible leak in the injection tubing and results in a shut down of the injection operation until the cause of the pressure change is identified. Because of the design and operational monitoring as described above, serious leaks from an injection well and contamination of underground aquifers can be prevented.

Because of the success of many state programs (and Texas is a prime example) along with the new, more stringent UIC regulations, I think it is fair to suggest that deepwell injection will continue to be a safe, valuable and essential disposal method. I also think we can expect a reduction in the few isolated contamination problems that have resulted from past practices that had less monitoring and less adequate technology. With implementation and enforcement of UIC regulations, drinking water sources will be protected from future contamination.

Our Institute wholeheartedly supports protection of drinking water sources. This is most effectively accomplished by enforcement of current UIC monitoring regulations. The existing well design standards and mechanical integrity testing requirements themselves assure protection of the groundwater aquifers through which the well passes. Constant monitoring of the annulus pressure gives immediate notice if any leak were to develop within the annulus tubing and certainly within the three (3) surrounding steel casings. The injection zone ranges from 1/4 to 1 mile from the surface; Class I wells are required to be below drinking water aquifers isolated by thick, impermeable strata.

We would ask this Subcommittee to be cautious in mandating increased monitoring activities at these sites. With each installation of a monitoring well, overlying strata are penetrated;

thus, we are providing man-made pathways for migration of injected fluid out of the reservoir. The need for additional monitoring, beyond current regulations, should be evaluated on a site-by-site basis. For this reason, we are concerned about the technical suitability of legislative mandates for additional monitoring requirements. The U.S. Environmental Protection Agency should be urged to review existing UIC programs and sites to determine when or where additional monitoring is required. We would hope that, should EPA propose changes, our Institute would have the opportunity to comment on specific recommendations.

While monitoring is an essential safeguard for operating Class I deepwells, properly constructed and operated under the existing UIC program, it is not evident that changes in monitoring requirements are necessary. The Institute would suggest that it may be of greater benefit to all to focus collective efforts on designing and installing technically effective facilities that will prevent damage to the environment. The safety of deep wells can be compromised by requiring additional, but perhaps not more effective monitoring efforts. Prevention of contamination is the over-riding concern. An ounce of prevention is clearly worth tons of cure where contamination of groundwater is involved. The ICWM is concerned that we might inadvertently reduce the effectiveness of existing deepwell technology by introducing monitoring procedures that, ironically, could contribute inadvertently to groundwater contamination.

I thank you for the opportunity to offer my comments to you on behalf of the Institute of Chemical Waste Management. I would be pleased to respond to any questions you may have.

ICWM
Institute of Chemical Waste Management
1730 Rhode Island Avenue, N.W., Tenth Floor, Washington, D.C. 20036 • 202/659-4613

July 26, 1984

The Honorable Dave Durenberger
U.S. Senate, Committee on Environment
and Public Works
Washington, DC 20510

Dear Senator Durenberger:

I am pleased to provide you with responses to questions raised regarding issues and statements in my testimony presented at the Committee Hearing on June 26, 1984. I hope these responses will be helpful as you develop the final format for amendments to the Safe Drinking Water Act.

1. How would additional requirements for monitoring have a negative affect on the safety on deep wells?

The key to use of deep well disposal as a safe management option for hazardous wastes is the presence of subsurface horizontal confining layers. These layers assure that waste material will not move upward from the well reservoir into drinking water sources. Any activity, such as installing monitoring wells, that would compromise the integrity of these confining layers must be viewed as undesirable. If the placement of additional monitoring wells should breach the integrity of these confining layers, it would provide "man-made" pathways for migration of the dilute waste materials into aquifers above the well reservoir.

2. If we cannot assure that we can prevent any leak from occurring now, doesn't that make a case for having a warning system so that an individual drinking contaminated water would know as soon as possible?

Much has been done in well design and construction requirements to prevent a leak at a deep well site. Granted that there cannot be 100% guarantee that a leak may never occur, the requirement to monitor annulus pressure provides a mechnism for detecting leaks immediately. In the view of the Institute of Chemical Waste Management, it is far better to have an immediate warning of trouble than to depend on the uncertain ability to detect contamination at points far removed from the well reservoir.

Detection of hazardous constituents in a groundwater source is not an easy task. Once contaminants become diluted in the aquifer, it is difficult to verify their presence. Due to the uncertainty of movement of a contaminated plume within the aquifer and the potential seasonal variations in quality of the groundwater, it is not always possible to provide early warning detection of aquifer contamination.

3. Are permissible concentrations for chemicals, found in the injection fluid which may be corrosive, specified in the UIC permit?

For Class I injection wells, the UIC regulations (40 CFR 146) required that the permitting agency consider the characteristics of the injection fluid prior to issuing a permit (e.g., chemical content, corrosiveness and density). Further, permits require analyses of the injected fluids at sufficient frequency to yield representative data.

An example of how such requirements are translated into permit conditions is provided by the following excerpt from an EMPAK permit issued by the Texas Department of Water Resources.

> "A corrosion monitoring test loop shall be installed in the waste stream flow line between the well head and the injection pump. This loop shall contain test coupons which will be continuously exposed to the waste stream. The test coupons shall be removed for inspection of corrosion a minimum of once every three months..."
>
> "The permittee shall file quarterly within twenty (20) days after the last day of March, June, September and December of each year, an acceptable report of the results of the corrosion monitoring utilizing coupons."

It is the view of the members of the Institute of Chemical Waste Management that an approach that requires actual corrosion measurement at the injection site is far more effective than requiring analyses for specific chemical constituents of wastes received at the facility.

If you have any questions about these responses, or would like further information, I would be happy to supply both. I can be reached by telephone at 202/659-4613.

The Institute of Chemical Waste Management is pleased to have an opportunity to assist your Committee in developing effective amendments to the Safe Drinking Water Act.

Sincerely,

Suellen Pirages

Suellen Pirages, Ph.D.
Director

SP:ec

Enclosures

cc: J. R. Piskura, Assistant Director
Planning and Development,
Pakhoed Corporation

STATEMENT BY

BILL KLEMT, CHIEF
UNDERGROUND INJECTION CONTROL SECTION
PERMITS DIVISION

TEXAS DEPARTMENT OF WATER RESOURCES
P.O. Box 13087, Capitol Station
Austin, Texas 78711

TO

SENATE ENVIRONMENT COMMITTEE
TOXIC SUBSTANCES AND OVERSIGHT SUBCOMMITTEE

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE, MY NAME IS BILL KLEMT. I AM THE CHIEF OF THE TEXAS DEPARTMENT OF WATER RESOURCES' UNDERGROUND INJECTION CONTROL SECTION WITHIN THE DEPARTMENT'S PERMITS DIVISION. ON BEHALF OF THE STATE OF TEXAS, I OFFER THE DEPARTMENT'S APPRECIATION FOR THE OPPORTUNITY TO APPEAR BEFORE THIS SUBCOMMITTEE.

THE FOLLOWING COMMENTS BRIEFLY DISCUSS THE HISTORY AND USE OF INJECTION WELLS IN TEXAS; THE SEQUENCE OF LEGISLATIVE ACTION TO INSURE PROTECTION OF GROUND-WATER RESOURCES; THE NUMBERS OF INJECTION WELLS IN TEXAS; THE TEXAS UNDERGROUND INJECTION CONTROL PROGRAM REQUIREMENTS; AND SECTION 1427 (A)(2) UNDER THE HEADING "REGULATION OF STATE PROGRAMS." THIS SECTION PERTAINS TO THE PROPOSED REQUIREMENT TO INSTALL MONITORING WELLS TO MONITOR UNDERGROUND DRINKING WATER SOURCES DOWN GRADIENT FROM CLASS I INJECTION WELLS.

TDWR UNDERGROUND INJECTION CONTROL PROGRAM

UNDERGROUND INJECTION BEGAN IN TEXAS OVER 70 YEARS AGO WITH SULFUR MINING BY THE FRASCH PROCESS. THE FIRST MAJOR PROJECT UTILIZING INJECTION WELLS FOR THE DISPOSAL OF LIQUID WASTES OCCURRED IN 1938 IN AN EAST TEXAS OIL FIELD WHERE SALT WATER PRODUCED WITH OIL FROM THE WOODBINE FORMATION WAS RETURNED TO THE LOWER PART OF THE FORMATION. THE INJECTION OF INDUSTRIAL WASTEWATER INTO SUBSURFACE STRATA, WHICH DO NOT PRODUCE OIL OR GAS, WAS PERMITTED AND REGULATED BY THE RAILROAD COMMISSION OF TEXAS IN THE EARLY 1950'S. TODAY THE RAILROAD COMMISSION REGULATES SUBSURFACE INJECTION ASSOCIATED WITH THE OIL AND GAS INDUSTRY, WHILE THE TEXAS DEPARTMENT OF WATER RESOURCES REGULATES THE MAJORITY OF OTHER UNDERGROUND INJECTIONS IN THE STATE.

OVER THE YEARS THE REGULATORY EFFORT REGARDING INJECTION WELLS IN THE STATE OF TEXAS HAS INVOLVED THE DEVELOPMENT AND REFINING OF INJECTION WELL LEGISLATION. IN 1961, THE 57TH LEGISLATURE ENACTED THE INJECTION WELL ACT IN ORDER TO PROTECT GROUND WATER FROM CONTAMINATION AS A RESULT OF THE INJECTION OF WASTES INTO THE SUBSURFACE THROUGH DISPOSAL WELLS. THE ACT REQUIRED THAT ANY PERSON SEEKING TO DISPOSE OF WASTE INTO THE SUBSURFACE MUST SECURE A PERMIT. THE ACT WAS AMENDED IN 1965 AND AGAIN IN 1969. IN 1971, THE 62ND LEGISLATURE PASSED THE TEXAS WATER CODE WHICH INCORPORATED AND REVISED THE INJECTION WELL ACT. THE ACT BECAME KNOWN AS THE DISPOSAL WELL ACT AND WAS CODIFIED IN CHAPTER 22 OF THE TEXAS WATER CODE.

IN 1981, THE DISPOSAL WELL ACT WAS AMENDED AND BECAME THE INJECTION WELL ACT UNDER CHAPTER 27 OF THE TEXAS WATER CODE. THE ACT PROVIDES FOR REGULATION OF

ALL UNDERGROUND INJECTIONS AND BECAME EFFECTIVE ON JUNE 17, 1981. A COMPLETE APPLICATION FOR PRIMARY ENFORCEMENT AUTHORITY FOR AN UNDERGROUND INJECTION CONTROL PROGRAM WAS SUBMITTED BY THE DEPARTMENT OF WATER RESOURCES TO THE ENVIRONMENTAL PROTECTION AGENCY REGION VI OFFICES IN DALLAS ON JULY 24, 1981. PRIMARY ENFORCEMENT AUTHORITY FOR THE DEPARTMENT'S UNDERGROUND INJECTION CONTROL PROGRAM BECAME EFFECTIVE ON JANUARY 6, 1982. AS YOU CAN SEE, TEXAS HAS HAD A LONG HISTORY OF INJECTION WELL ACTIVITY AND THE LEGISLATIVE CONCERN TO REGULATE THAT ACTIVITY. UNLIKE MANY STATES, THE USE OF WELLS TO PLACE FLUIDS IN THE SUBSURFACE IS NOT A NEW CONCEPT OR PROGRAM FOR US.

TEXAS HAS MORE THAN 40,000 CLASS II INJECTION WELLS ASSOCIATED WITH THE PRODUCTION OF OIL AND GAS, IN EXCESS OF 20,000 CLASS III SOLUTION MINING WELLS, APPROXIMATELY 120 CLASS I WASTE DISPOSAL WELLS, AND AN UNKNOWN NUMBER OF MISCELLANEOUS WELLS. THE APPLICATION OF UNDERGROUND INJECTION WELLS INCLUDES: MUNICIPAL AND INDUSTRIAL WASTE DISPOSAL; SECONDARY OIL RECOVERY AND SALT WATER DISPOSAL; STORAGE OF NATURAL GAS AND PETROLEUM PRODUCTS IN UNDERGROUND RESERVOIRS; PREVENTION OF THE INTRUSION OF UNDESIRABLE WATER INTO FRESH GROUND-WATER RESOURCES; RECOVERY OF MINERALS, SUCH AS SULFUR, URANIUM, AND SODIUM SULFATE; INJECTION OF FLUIDS TO CONTROL LAND-SURFACE SUBSIDENCE; AND THE INJECTION OF EXCESS AGRICULTURAL OR URBAN RUNOFF AND EXCESS PONDED SURFACE WATERS.

OVER THE YEARS THE DEPARTMENT HAS DEVELOPED RULES AND GUIDELINES SETTING FORTH MINIMUM CONSTRUCTION, OPERATING, MONITORING, REPORTING, AND RECORD KEEPING

REQUIREMENTS FOR ALL PERMITTED INJECTION OPERATIONS. CONSTRUCTION REQUIREMENTS SET FORTH MINIMUM STANDARDS FOR CEMENTING METHODS AND MATERIALS, WELL CONSTRUCTION MATERIALS, USE OF PACKERS OR AN APPROVED EQUIVALENT, LOGGING AND PREOPERATION TESTING PROGRAMS, AND INJECTION ZONE DATA TO BE DETERMINED. OPERATING REQUIREMENTS INCLUDE LIMITATIONS ON INJECTION PRESSURE, INJECTION RATES, AND VOLUMES OF FLUIDS INJECTED. MONITORING INVOLVES INJECTION FLUID ANALYSIS; RECORDING OF INJECTION PRESSURE, FLOW RATES AND VOLUME, AND ANNULUS PRESSURE.

DURING THE LIFE OF A PERMITTED FACILITY, DEPARTMENT RULES AND PERMIT PROVISIONS REQUIRE PERIODIC TESTING, WHICH INCLUDES MECHANICAL INTEGRITY, AND THE SUBMISSION OF REPORTS OF OPERATION. IN ADDITION, SOME CLASS III FACILITIES MAY BE REQUIRED TO RESTORE CERTAIN AQUIFERS AND SUBMIT REGULAR REPORTS OF RESTORATION PROGRESS. BASIC REPORTING REQUIREMENTS SPECIFY QUARTERLY MONITORING REPORTS AND REPORTS OF ALL PERIODIC TEST RESULTS. IN ADDITION, CLASS I FACILITIES SUBMIT QUARTERLY OPERATIONS REPORTS. OWNERS OR OPERATORS ARE REQUIRED TO MAINTAIN FILES OF ALL MONITORING AND TESTING FOR A SPECIFIED NUMBER OF YEARS AFTER FACILITY CLOSURE. AS A RESULT OF THESE REQUIREMENTS, NO CLASS I INJECTION ACTIVITY UNDER THE DEPARTMENT'S JURISDICTION HAS CONTAMINATED EITHER GROUND OR SURFACE FRESHWATER RESOURCES.

THE INSTALLATION OF MONITORING WELLS AROUND CLASS I INJECTION WELLS HAS BEEN CONSIDERED NUMEROUS TIMES BY STAFF AND DISCUSSED EXTENSIVELY IN PUBLIC HEARINGS CONCERNING CLASS I INJECTION WELLS. HOWEVER, THE QUESTIONABLE CAPABILITIES OF

SUCH WELLS TO EFFECTIVELY MONITOR THE OPERATIONAL STATUS OF A CLASS I INJECTION WELL HAVE THUS FAR OUTWEIGHED PROPOSALS TO REQUIRE MONITOR WELLS. THE DEPARTMENT OFFERS THE FOLLOWING COMMENTS REGARDING THIS ISSUE:

1. THE DEPARTMENT REQUIRES SURFACE CASING TO BE SET TO AT LEAST 50 FEET BELOW USEABLE WATER ($\geq$3,000 TDS) AND BE CEMENTED TO THE SURFACE. LONG STRING CASING IS THEN SET THROUGH THE BASE OF USABLE QUALITY WATER TO THE TOP OF OR INTO THE INJECTION ZONE AND IS LIKEWISE CEMENTED TO THE SURFACE. THIS COMPLETION PRACTICE RESULTS IN A SUBSTANTIAL BARRIER TO POLLUTION OF UNDERGROUND DRINKING WATER RESOURCES AS A RESULT OF WELL FAILURE. IT IS MUCH MORE PROBABLE THAT POLLUTION FROM SURFACE FACILITIES WOULD OCCUR AND BE DETECTED BY MONITOR WELLS INSTALLED IN NEAR SURFACE DRINKING WATER SOURCE AQUIFERS.

2. INSTALLATION OF MONITORING WELLS INTO SOURCES OF DRINKING WATER WILL NOT DETECT EXCURSIONS FROM AN INJECTION ZONE UNLESS:

   A. THE EXCURSION EXTENDS UPWARD TO NEAR SURFACE WHERE SOURCES OF DRINKING WATER ARE PRESENT. HISTORY DOES NOT SUPPORT THE LIKELIHOOD OF THIS OCCURRING; OR,

   B. MONITORING WELLS ARE PRECISELY LOCATED AND COMPLETED IN AN AQUIFER CONTAINING DRINKING WATER AT THE SITE OR SITES WHERE AN EXCURSION FROM THE INJECTION ZONE WOULD MIGRATE. IN THE CASE OF DEEP BASIN CIRCULATION

WHERE THE INJECTION ZONE IS SEVERAL THOUSAND FEET BELOW THE BASE OF USABLE-QUALITY GROUND WATER, A POSSIBLE EXCURSION MAY REQUIRE MILLIONS OF YEARS TO ENTER AN UNDERGROUND SOURCE OF DRINKING WATER AND MAY OCCUR HUNDREDS OF MILES IN THE DOWN GRADIENT DIRECTION FROM AN INJECTION SITE. SELECTING EFFECTIVE MONITORING WELL SITES UNDER THESE CONDITIONS WOULD BE FORTUITOUS AT BEST, AND IN REALITY IMPOSSIBLE.

3. SHOULD A MONITORING WELL BE PLACED IN CLOSE PROXIMITY TO AN INJECTION WELL, ANY EXCURSION WOULD MOST LIKELY BE DUE TO A CASING LEAK. AS SUCH, MONITORING OF THE INJECTION WELL ANNULUS PRESSURE WOULD PROVIDE IMMEDIATE DETECTION OF A LEAK, WHEREAS A MONITORING WELL COULD FAIL TO DETECT AN EXCURSION ALTOGETHER.

4. IN ORDER TO DESIGN AND SELECT SITES FOR WELLS TO MONITOR UNDERGROUND DRINKING WATER SOURCES AROUND INJECTION WELLS, THE DIRECTION AND MAGNITUDE OF THE GROUND-WATER GRADIENT MUST BE DETERMINED. THIS MAY BE DETERMINED BY WATER LEVEL MEASUREMENTS. HOWEVER, WHERE GRADIENTS ARE NEARLY FLAT, A PRECISE DETERMINATION MAY BE IMPOSSIBLE. GRADIENTS MAY ALSO BE TEMPORARILY OR PERMANENTLY ALTERED WHEN GROUND WATER IS DEVELOPED FOR USE. IN PROLIFIC AQUIFERS WITH LOW GRADIENTS THE DIRECTION OF FLOW CAN BE CHANGED BY THE ESTABLISHMENT OF HYDRAULIC PRESSURE SINKS AT WELL SITES WHERE GROUND WATER IS PRODUCED. MONITORING WELLS COULD IN EFFECT BE RENDERED USELESS.

5. ANOTHER FACTOR AFFECTING THE EFFECTIVENESS OF MONITORING WELLS IS THE CONTINUITY OF STRATA HORIZONTALLY AND VERTICALLY. AQUIFERS ARE OFTEN INTERRUPTED HORIZONTALLY BY THE PRESENCE OF CLAY AND SHALE LENSES AND OTHER LOW PERMEABILITY MATERIALS. THIS DISCONTINUITY IN AQUIFER SEDIMENTS MAY RADICALLY AFFECT THE DETECTION CAPABILITY OF MONITORING WELLS REGARDLESS OF THE NUMBER OF WELLS INSTALLED. CONVERSELY, THE PATH OF A POLLUTANT IN NEAR SURFACE SEDIMENTS CONTAINING USABLE-QUALITY WATER MAY BE DIFFICULT TO DETERMINE. ADDITIONALLY, BECAUSE THERE MAY VERY LIKELY BE MULTIPLE DRINKING WATER SOURCE AQUIFERS AT A GIVEN SITE, MONITORING WELL SITE SELECTION, NUMBERS AND SAMPLE COLLECTION PROBLEMS ARE INCREASED MANY TIMES.

IN CONCLUSION, THE TEXAS DEPARTMENT OF WATER RESOURCES DOES NOT BELIEVE, AT THIS TIME, THERE IS SUFFICIENT EVIDENCE THAT INSTALLING MONITORING WELLS AROUND CLASS I WELLS PROVIDES SIGNIFICANT ADDED SECURITY BENEFITS. WHERE CLASS I INJECTION WELLS ARE PROPERLY DESIGNED AND CONSTRUCTED THE DEPARTMENT'S EXPERIENCE IS THAT UNDERGROUND AND SURFACE FRESHWATER SOURCES HAVE NOT BEEN CONTAMINATED BY A CLASS I INJECTION WELL.

IN CLOSING, THE TEXAS DEPARTMENT OF WATER RESOURCES AGAIN EXTENDS ITS APPRECIATION FOR THE OPPORTUNITY TO ADDRESS THE SUBCOMMITTEE.

Questions for Bill Klemt

1. You mentioned Texas has in excess of 20,000 Class III solution mining wells.

   - Are the State's requirements for ground water quality restoration for Class III activities consistent with the amendment in S. 2649?

2. You have also indicated that as a result of your stringent UIC program regulations no Class I injection activity under the department's jurisdiction has contaminated either fresh ground or surface water.

   - How would one know if such contamination had occurred without monitoring since the toxics would be dilute enough that they would not be apparent in many cases?

3. No monitoring outside the well means we are relying on the absolute stability of the subsurface geology and the mechanical and operational integrity of the well.

   - Has the State instituted special measures for ensuring quality control in the design construction and installation of wells and operational requirements?

4. Ms. Leslie Bell, administrator of the Florida underground storage tank program has identified the lack of federal permitting guidelines for Class V wells as a serious deficiency in the existing program.

   - Has this also been a problem in Texas? What, if any, additional requirements should be imposed on Class V well construction and operation?

5. At the first hearing on Safe Drinking Water Act amendments, we heard the public water supply representatives express the view that well operators be required to notify public water supply systems of the location of any wells that might affect their water supply in the event of a leak.

   - Is this information made available to water suppliers in your States?

   - Could such a requirement be effectively incorporated into a state program - say as another condition of a permit?

1. The TDWR requires restoration of ground-water quality at the termination of Class III mining operations to parameter levels consistent with baseline (pre-mining water quality). This is different from the approach taken in the amendment.

2. The possible contamination of fresh ground and surface water by Class I injection well operations can be more readily determined by close monitoring of daily well operations, periodic testing for mechanical integrity and testing for fluid movement behind or through the casing. Annulus pressure is continuously monitored whether the well is operating or not to detect any pressure loss or increase. Annulus pressure losses or increases would indicate the possibility of a leak into or out of the annulus. Test procedures would be initiated to determine the problem and whether well integrity was compromised. Fluid movement out of the injection zone by way of the borehole is monitored by radioactive tracer or temperature surveys to pinpoint the location of injected fluids. The Thermal Decay Time (TDT) log also provides a means to recognize the presence of injected fluid behind the casing and is thus useful for diagnosing problems and following reservoir performance. These procedures are more timely and accurate than relying upon monitoring well data.

3. The Texas Department of Water Resources, at a minimum, requires that wells be designed and constructed in accordance with standards for materials and good engineering practices in the petroleum industry. API standards would, therefore, be the minimum standards acceptable to the Department. Acceptable design and construction practices are evaluated during review of well applications. Once approved, Department staff are present for the installation

and cementing of surface and longstring casing. TDWR permits for Class I wells include operational restrictions which are reflective of the particular reservoir mechanics, well design, well materials, and waste stream characteristics. This is standard for all Class I wells.

4. The TDWR UIC program has the option to require permits for Class V wells by type or on a well by well basis. The Department has conducted an assessment of each type of Class V wells operated in Texas to provide a basis for deciding how to regulate Class V systems. The results of these assessments indicate that some permitting will be necessary to effectively regulate potential impacts on ground water and, in addition, that minimum construction standards generally applicable to these systems should be imposed by rule. The Department is currently in the process of proposing construction rules to (1) cement casing to a minimum depth of 10 feet; (2) require a minimum 2 foot square cement slab centered on the well casing at land surface; (3) require a minimum 1 foot extension of well casing above land surface; and (4) include the use of pitless adapters in certain cases.

5. Information on all Class I wells is available to any interested persons. Public notice is required whenever a new Class I well is proposed or an existing Class I well permit is to be amended. In addition, once a permit is issued a copy must be filed with local health and pollution control authorities of the county, city, and town where the well is located. Documentation of this filing must be provided to the Executive Director before new wells are authorized to begin injection operations.

   Notification of local authorities as to the location of Class I wells by well owners/operators should be part of any state program and a permit condition.

INDUSTRIAL WASTE DISPOSAL BY DEEP WELL INJECTION

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ABSTRACT

Currently there are over 400 industrial waste disposal wells operating in the United States. Hydrogeology, reservoir mechanics, well design, compatibility of injected fluid with the receiving formation, and potential hazards to usable ground water are important aspects and must be evaluated prior to using a waste disposal well. When disposal wells are properly operated, they provide safe wastewater disposal.

INTRODUCTION

Subsurface or underground waste disposal is the placing of a waste fluid beneath the surface of the ground by injection down a well. It is a very useful technique with many applications; therefore, it has become a practical solution to some very difficult disposal and storage problems. Because of its complexities, well injection is a relatively costly technology.

The advantages of underground disposal of wastewater are: (a) the fate of the waste is, in general known and understood; (b) the waste is contained and can be isolated from man's food, water, air, and activity; and, (c) the waste can be recovered if the need arises.

Systematic underground injection came into use about fifty years ago to dispose of salt water brines associated with oil and gas production. Over one hundred thousand injection wells have been constructed to dispose of these brines. Compared with these wells, there are about 400 industrial waste disposal wells operating in the United States. A recent EPA survey discovered that, of the 400 or so wells, only about 170 of these wells are injecting hazardous wastewater. The waste liquid volumes injected into these wells account for slightly less than 60% of the hazardous waste generated each year in the Nation.

The wastes most frequently injected into these wells are brines containing organic compounds, corrosive wastes, reactive wastes, and metals. The majority of the hazardous wastewater injection wells are located in the South and Midwest; most of these in Texas and Louisiana.

The Safe Drinking Water Act of 1974, as amended, contains specific provisions concerning wastewater injection wells. These regulations recognize both the need for the protection of ground water from contamination from underground injection, and the need for effective state regulatory programs. Consequently, many states and the federal government have now adopted comprehensive regulations governing the design, construction, and operation of these wells.

This paper provides a brief analysis and overview of current injection well practices. It also discusses geologic and hydrologic considerations, design, construction, operation, and closure of wastewater injection wells. Regulatory aspects of underground injection are presented in terms of the minimum criteria necessary to protect ground water.

GEOHYDROLOGY

The hydrogeology of the subsurface environment must be known at the injection well site and in the surrounding region prior to evaluating the suitability of the site for wastewater injection and for the design, construction, and operation of a well. In defining the hydrogeology, the subsurface rock units must be described in terms of: lithology (i.e., sand, shale, limestone); thickness, areal distribution; depositional and structural configuration (i.e., faulting, folds, lateral changes in lithology, confining intervals, etc.) and engineering properties (i.e., porosity, permeability, etc.). The chemical nature of the formation fluids and the regional subsurface flow system must also be known.

Two very important properties which must be known are porosity and permeability. Porosity is the percentage of void space not occupied by the rock matrix. It may be intergranular, solution channels, fractures, etc.. If a rock unit has low porosity, it is not a likely candidate for receiving waste. Permeability is a measure of the formation's capacity to transmit a fluid. All rock units have permeability, although in the case of granite or cement it may be so low as to be difficult to measure under a normal pressure differential.

A rock unit considered for injection must have sufficient permeability to allow the fluid to penetrate into the void (porosity) without the need for undue pressure. Shales and clays usually have low coefficients of permeability and tend to restrict the movement of fluids. Waste can be injected into clays (or shales) only at an extremely slow rate, thus clays are generally not suitable for injection. By contrast, sands, gravels, and vugular or fractural limestones may have high permeabilities and are usually given consideration as disposal rock units.

Actual or potential receiving rock units are commonly called the injection interval, zones, or reservoirs, and the intervening strata with low coefficients of permeability are referred to as confining intervals.

The ideal reservoir should have the following characteristics: (a) sufficiently thick with adequate porosity and permeability; (b) large areal extent; (c) adequate confining intervals; (d) simple structural geologic conditions (free of complex faulting and folding); (e) injection interval adequately separated from useable-quality ground water; and, (f) formation fluids in the injection interval of no apparent value, and not incompatible with the waste to be injected.

The Frio barrier bar system (oligocene in age) is an example of an ideal disposal reservoir. The massive sand bar is analogous to the present day Matagorda-Padre-Mustang Islands and consists of an elongate thick body of laterally desposited shoreline sands bounded by lagoonal muds on the landward side and by continental shelf clays and shales on the seaward side. The Frio is found at moderate depths (6,000 feet or so) and consists of coarse to fine grained, well sorted, porous Quartzose sands. In cross-section (Figure 1) the Frio barrier bar appears as a massive sand confined by overlying and underlying strata and bounded laterally by less permeable lagoonal and marine deposits.

ARTIFICIAL PENETRATIONS

The large number of oil and gas wells drilled in many parts of the Nation can create a potential environmental hazard with regard to evaluating a proposed injection well site. Many of these wells drilled in the early 1900's were only plugged with drilling mud since this was the accepted plugging method. If formation pressures are elevated sufficiently by injection operations, inadequately plugged wells

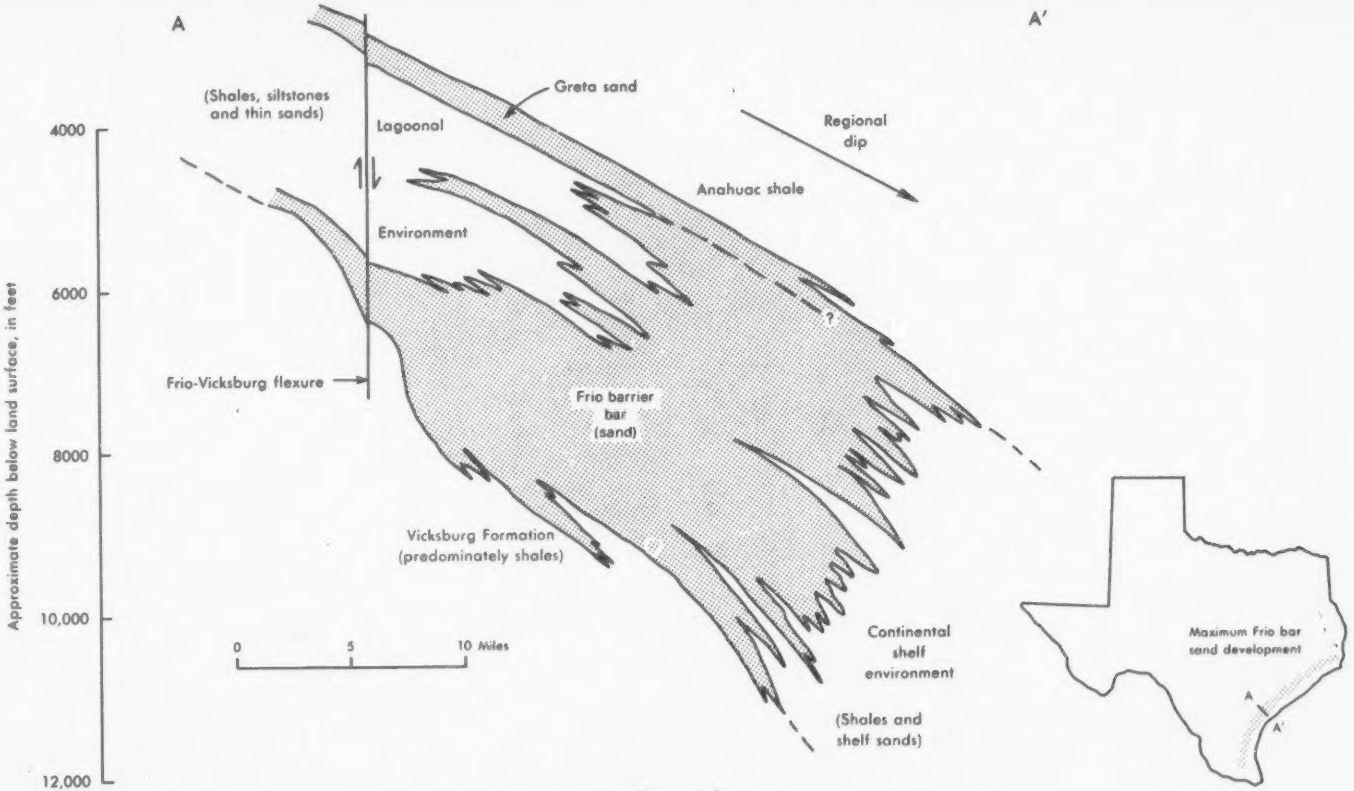
A
A'
(Shales, siltstones and thin sands)
Lagoonal
Environment
Greta sand
Regional dip
Anahuac shale
?
Frio-Vicksburg flexure
Frio barrier bar (sand)
Vicksburg Formation (predominately shales)
Continental shelf environment
(Shales and shelf sands)
Approximate depth below land surface, in feet
4000
6000
8000
10,000
12,000
0
5
10 Miles
Maximum Frio bar sand development
A
A'

Figure 1
Frio Barrier Bar Dip Section,
Refugio and Aransas Counties, Texas
(Modified From Boyd and Dyer, 1964)

which penetrate the disposal zone can provide an avenue for waste fluid or native formation brines to move vertically through the abandoned wellbore to contaminate usable-quality ground water. To avoid this problem, injection pressures and injection volumes must be limited to prevent excessive pressure build-up in the injection zone. Drilling, casing, cementing, and plugging records for all wells drilled within the "Area of Review" of a proposed waste disposal well must be researched to evaluate the threat to ground water and to set proper surface injection pressures and volume rates.

The area of review is the area surrounding an injection well or group of wells for which pressure data are calculated, artificial penetrations are evaluated, and detailed studies of the reservoir are made. The Texas Department of Water Resources uses a radius of 2-1/2 miles from the proposed waste disposal well to fix the area of review. In addition to the standard geological and engineering data sources (i.e., published reports, geophysical logs, surface geophysics, etc.), old well logs, plugging reports, scout tickets, and even contacting the original operators of abandoned oil tests can be used to provide the information necessary to properly evaluate the proposed injection operation.

WASTEWATER

It is not necessary to know the exact chemical composition of a wastewater for injection purposes. However, all of the design and operational problems related to the wastewater should be anticipated so as to provide for these problems by proper design of the facility, plant process control, wastewater pretreatment, and operational procedures. Factors which should be considered in evaluating the suitability of wastes for deep well disposal include: (a) physical characteristics (density, viscosity, suspended solids content, etc.); (b) chemical characteristics (dissolved constituents, pH, chemical stability, reactivity, and toxicity); and, (c) the biological growth potential.

After the physical, chemical, and biological characterisitics of a wastewater have been evaluated, two questions must be answered: Can the waste stream be safely, efficiently, and economically injected at the proposed site? Is injection the most environmentally and technologically desirable alternative?

There is no simple basis for ranking all of the factors to arrive at a decision as to whether or not injection is desirable. There are few, if any, wastewater characteristics that cannot be modified to render a waste liquid injectable. However, if too extensive pretreatment or too elaborate facility design is required, then underground injection is not the best available alternative. It is also possible that the quantity of wastewater to be injected is so large as to make disposal by injection infeasible.

If it is determined that a wastewater is injectable technologically, then the relative desirability of injection, as compared with other environmental alternatives, should also be considered. Many regulatory authorities will allow wastewater injection only when it is determined that underground injection is the best available alternative in the specific circumstances of the case. Waste management in this area is desirable because the injection of liquid wastes into a disposal reservoir constitutes the utilization of limited useful space.

RESERVOIR MECHANICS

The physical characteristics of a reservoir that must be considered in determining the suitability of a geologic formation for wastewater disposal are the thickness, porosity, transmissivity, and storage. These are the parameters necessary to determine the pressure buildup and effluent distribution due to the injection operation. The chemical-physical aspect to consider in injection is the compatibility of the receiving stratum and its formation fluids with the wastewater.

The coefficient of transmissivity provides an index of a reservoir's ability to transmit fluids and is usually expressed as gallons per day per foot (gal/d)/ft.. The coefficient of permeability may be calculated by dividing the transmissivity by the thickness of the aquifer. The coefficient of storage is the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in the component of hydrostatic pressure normal to that surface. In confined or artesian reservoirs, it is the result of two elastic effects - compression or expansion of the formation fluids and the aquifer skeleton. Porosity has been previously discussed and is the percentage of void space not occupied by the rock matrix.

Where the porosity, permeability, and thickness are uniform in a horizontal disposal reservoir (lacks regional dip and hydraulic gradient), a good estimate of the minimum distance of wastewater flow from an injection well can be made by assuming that the wastewater will uniformly occupy an expanding cylinder with the well at the center. The equation for this simple case in which regional ground-water flow and dispersion is not considered is:

$$r = \left(\frac{Q}{\pi h \phi}\right)^{\frac{1}{2}}$$

where:

r = The radial distance of distribution in feet

Q = Quantity of wastewater in cubic feet per unit of time

ϕ = Average porosity

h = Thickness of reservoir in feet

For example, an injection well operating at 500 gallons per minute for 20 years with a reservoir thickness of 200 feet and porosity of 30 percent results in the fluid moving approximately 3/10 of a mile radially from the wellbore.

Upon injecting wastewater into a reservoir, a cone of impression is developed (i.e., a rise of the potentiometric level around the well). Conversely, the withdrawal of water from an aquifer causes a cone of depression to develop around the wellbore. A typical cone of impression is shown in Figure 2. It

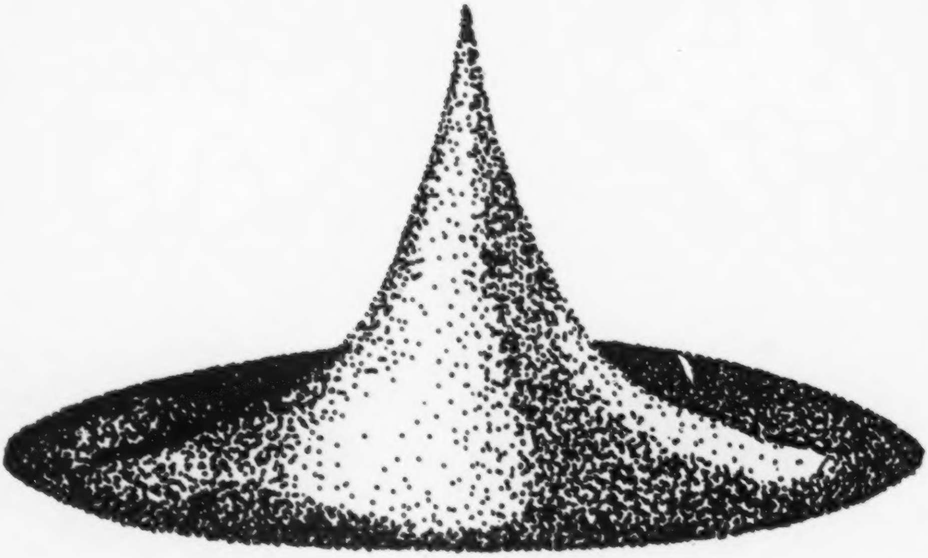

Figure 2
Schematic Cone of Impression Around Wellbore

can be observed that any point on the potentiometric surface is correlative with the pressure of the fluid within the formation immediately below the point. Injection or withdrawal increases or decreases the natural hydraulic gradient around the wellbore.

The coefficient of transmissivity and storage may be used to predict future pressure increases due to the injection of wastewater. Figure 3 shows the relation of pressure increases in the reservoir to the distance from the center of injection for representative values of transmissivity and storage. For example, on Figure 3 the pressure increase would be about 17.5 psi at a distance of 1 mile from a well or group of wells injecting 100 gallons per minute for 1 year.

Fluids that are injected into a proposed reservoir must be compatible with the rock matrix and the formation fluids. Some of the problems encountered are:

1) Acidic waste reacting with the carbonate material of the reservoir and causing a precipitate.

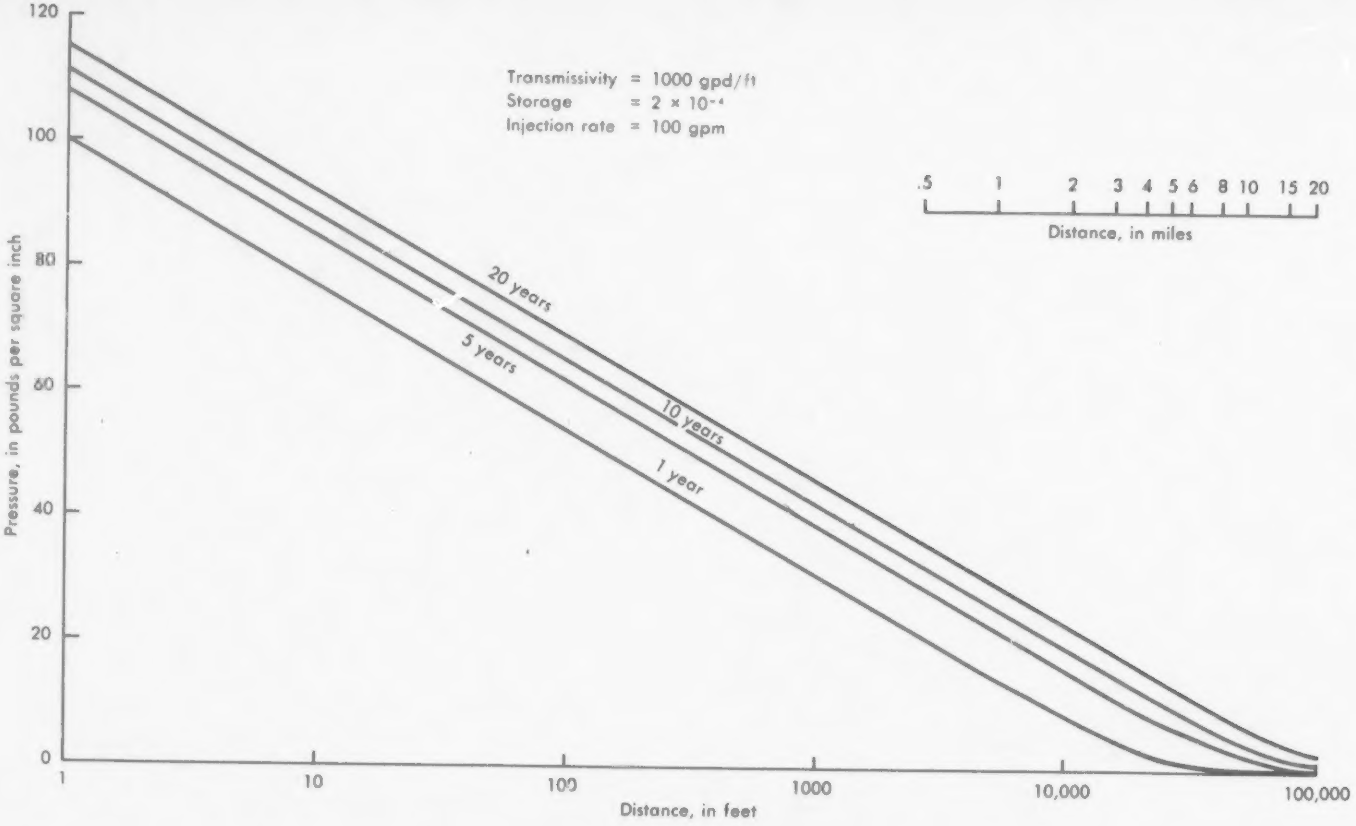

Figure 3
Pressure Increase in an Infinite Homogeneous
Reservoir Under Single Injection Rate

2) Alkaline waste reacting with the reservoir clays and causing swelling of the clay.

The equations and examples given above are for the most basic hydrogeologic circumstances. However, cases of virtually any complexity can be analyzed by use of an appropriate solution to the basic flow equations. Where simple analytical solutions are not possible, numerical computer models can be developed. The limitations to computer model analysis of pressure buildup, subsurface transport of mass and energy, and the fate of pollutants are usually practical rather than theoretical for the following reasons: (a) lack of data, or (b) the fact that an approximate estimate is sufficient for the circumstances.

WELL CONSTRUCTION PRACTICES

The construction of a waste disposal well must be such that ground-water resources are adequately protected and the injected fluid is confined to the disposal zone. A typical Texas Gulf Coast industrial waste disposal well would be completed as shown on Figure 4 and includes the following: (a) surface casing - 1000 feet; (b) protection casing (long string) - 6000 feet; and (c) 200 - 300 feet of perforated or screened interval below 6000 feet. The surface casing is set from the surface to a depth below the base of usable-quality ground water, and then cemented back to the surface. The long string casing is set from the surface to either the top or through the entire disposal zone. This casing is usually cemented to the surface by circulating cement from total depth, or by cementing the upper part by circulating through a multiple-stage cementing tool installed in the casing below the base of usable-quality ground water. The casing is pressure tested to assure there are no leaks.

Injection of waste as shown in Figure 4 is through tubing which is set into a packer and is made of materials that will not be affected by the injected waste. Materials commonly used in the construction of the tubing are carbon steel, internally plastic coated steel, fiberglass, and stainless steel.

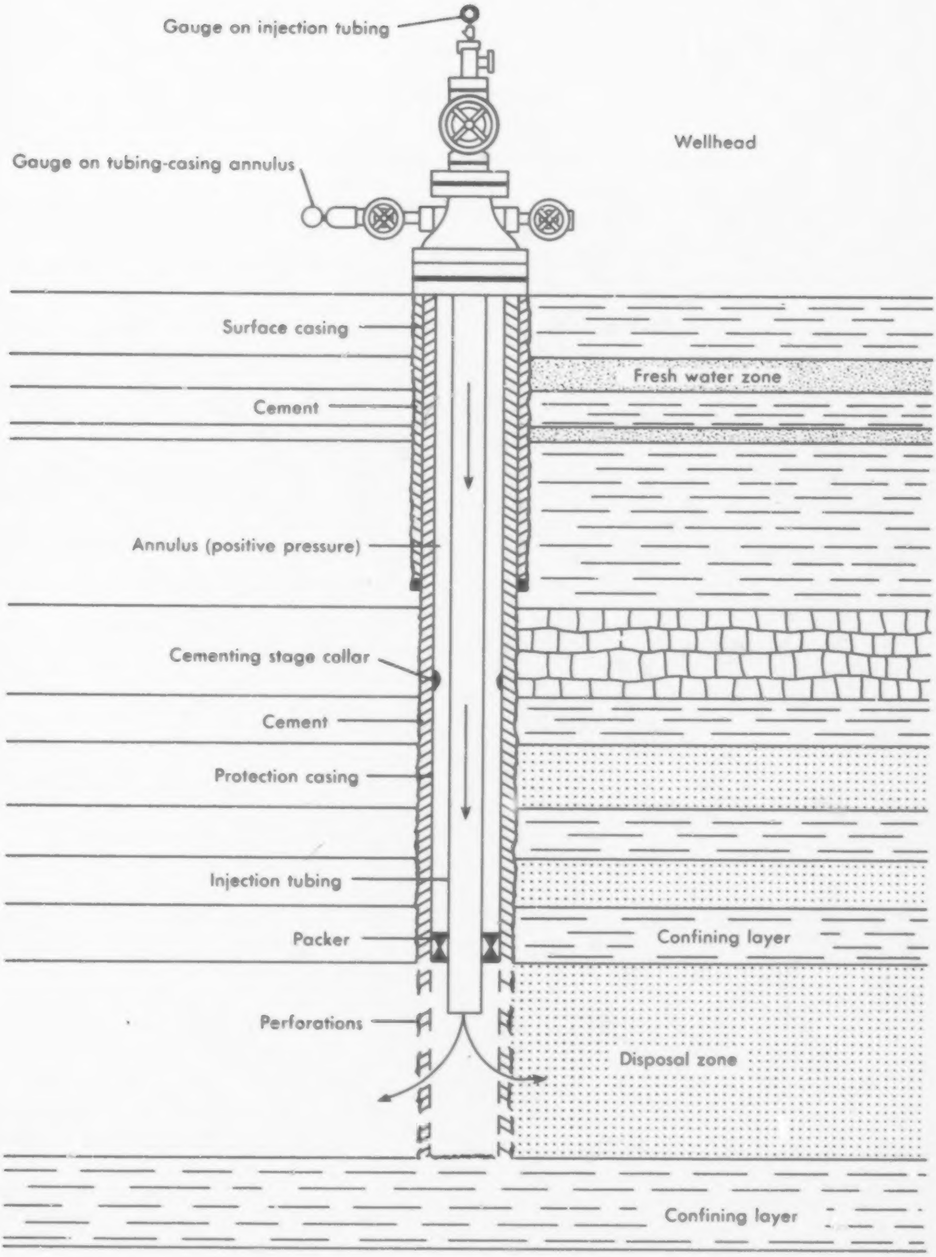
Gauge on injection tubing
Wellhead
Gauge on tubing-casing annulus
Surface casing
Fresh water zone
Cement
Annulus (positive pressure)
Cementing stage collar
Cement
Protection casing
Injection tubing
Packer
Confining layer
Perforations
Disposal zone
Confining layer

Figure 4
Typical Industrial Waste Disposal Well

Screens, if utilized below the long string casing, are usually made of stainless steel.

A pressure gauge should be installed on the wellhead for monitoring the pressure on the annulus between the injection tubing and the long string. Should a leak occur in the tubing or the packer seat, a pressure change on the annulus during injection would be indicated by the gauge and remedial action can be initiated to correct the malfunction. A gauge on the injection tubing should also be required to monitor the surface injection pressure.

OPERATIONAL PRACTICES

Basic wastewater pretreatment methods used to achieve trouble-free disposal well operation vary with wastewater properties and geologic conditions in the disposal zone. Pretreatment ranges from systems in which only temporary wastewater storage is required, to ones requiring a complex sequence of steps. The basic pretreatment operations prior to injection of wastewater (not necessarily for every well, nor in the sequence given) are as follows: (a) storage and equalization; (b) oil separation; (c) solids removal, (d) chemical and/or biological treatment; (e) corrosion and bacterial control; and, (f) degasification.

Experience has shown that waste disposal wells operate with fewer problems when they are in constant use, thus avoiding frequent start-ups and shut-downs. Such abrupt changes in injection rates may cause pressure surges through the wells which jar the tubing and packer, and may contribute to sand problems in the well completion zone.

In highly permeable reservoirs, many newly completed wells require no positive surface injection pressure. In these situations, the weight of the wellbore column of wastewater alone is generally sufficient to drive injection. Gradually, however, most wells begin to require increasing amounts of surface injection pressure to maintain the desired disposal rate. An operator will usually increase the surface injection pressure as needed, up to the maximum permitted injection pressure which is imposed by regulatory agencies to guard against fracturing the disposal formation. Situations requiring increased surface injection pressure for a desired injection rate are generally caused by the well "Sanding In" and/or by precipitation of solids from mixing of incompatible waste fluids and formation brines. Fine precipitates especially tend to impair formation permeability immediately around an injection wellbore, deceasing a well's injection capability.

The two most common corrective measures used on waste disposal wells for problems with unconsolidated formation sands and chemical precipitants are acidizing and backflowing wells with nitrogen gas. Acid dissolves many chemical precipitants from the interface of the wellbore and disposal formation. Nitrogen introduced into well fluids in the completion interval through a thin coiled tubing creates a froth of lessened density relative to disposal reservoir fluids, and results in a backflow of reservoir fluid into the wellbore. Using nitrogen in this manner, sand and other fine particles can be jetted from the wellbore back to the surface. Both acidizing and nitrogen jetting can be performed through the injection tubing of a well.

Initial well completions commonly use only the lowermost portion of a permitted disposal zone to allow for future recompletions uphole when new disposal reservoirs are needed. The general rationale for using lower potential disposal zones first is that it is easier to properly plug and abandon a zone and recomplete uphole than to case-off an abandoned disposal zone and recomplete in a deeper zone.

Other important operational features of waste disposal wells include gauges, continuous recorders, and alarm and automatic shut-off devices to regulate maximum surface injection pressure and injection rates. Similar instrumentation also monitors the sealed tubing-casing annulus system to detect leaks (Figure 4). Finally, waste disposal wells must pass periodic inspections and demonstrate mechanical integrity (absence of leaks) by a program of casing pressure tests and down-hole logs.

WELL CLOSURE

A waste disposal well that is permanently removed from use must be plugged with cement to assure proper closure. The purpose of plugging the well is to assure that the disposed wastewater is confined permanently after operations have ceased to the injection zone.

Obviously, a standard method of well plugging cannot be adopted because of the different types of well construction utilized. However, certain minimum guidelines can be formulated. Basically, three cement plugs should be placed in the previously used waste disposal well. First, a plug should be placed across the injection zone to seal it and prevent backflow. A second plug should be placed across the base of the surface casing to extend above and below the casing shoe approximately 50 feet. This plug affords protection from upward flow of fluid from any lower zone into the casing opposite usable-quality ground water. The third plug should be placed in the top of the cased well and should extend 10 to 30 feet below the ground. Cement plugs should also be set across the cementing stage collar (if appropriate), oil and gas producing horizons, and high pressure salt water strata.

After plugging operations have been completed, the casing should be cut off below ground level and a steel cap welded on the casing. A permanent marker should also be erected at the well site indicating permit number, company well number, dates of operation, and date plugged. Figure 5 illustrates the above method.

ENVIRONMENTAL CONCERNS

The record of industrial waste disposal wells to date is excellent, but underground injection has limitations. Not all geological formations are suitable for receiving injected fluids and those which are desirable become fewer when one considers all the conditions necessary for a successful injection well operation. Only a few incidents of failure have been reported to EPA and most of these have resulted from

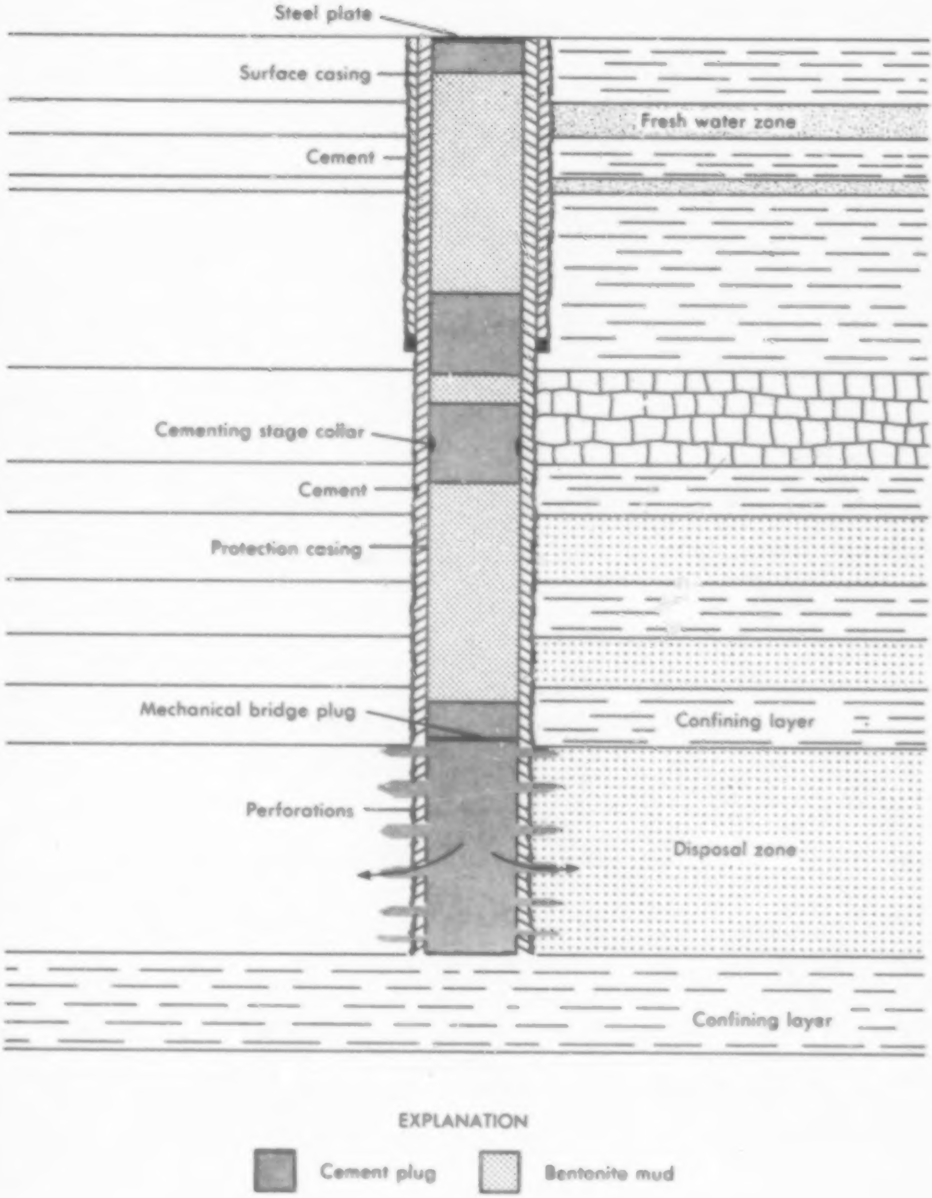
Steel plate
Surface casing
Fresh water zone
Cement
Cementing stage collar
Cement
Protection casing
Mechanical bridge plug
Confining layer
Perforations
Disposal zone
Confining layer
EXPLANATION
Cement plug
Bentonite mud

Figure 5
Typical Plugged and Abandoned
Industrial Waste Disposal Well

conditions that would not be permitted under current state and federal regulations.

The most publicized waste disposal well problem occurred at the Rocky Mountain Arsenal in Colorado. Wastes injected into a zone of fractured rocks resulted in a series of small earthquakes. In Pennsylvania, wastes injected by a paper company began to surface some distance away on an island in Lake Erie. These wastes were being injected at excessive surface injection pressures. In North Carolina wastes at a chemical plant escaped from the injection zone because of the lack of a suitable reservoir and confining strata.

Most states and the federal government have now adopted comprehensive regulations governing the design, construction, and operation of waste disposal wells. In Texas the record of success of industrial waste disposal wells without a single demonstrated case of usable-quality ground-water contamination is in large part the result of regulation by permit which includes:

1. Requiring good casing and cementing practices in well construction;
2. Limitations on maximum allowable surface injection pressure and injection rate;
3. Evaluation of reservoir properties and artificial penetrations;
4. Well integrity monitoring to detect malfunctions or materials failures such as casing, tubing, or packer leaks;
5. Record keeping, reporting requirements, and periodic inspection to check for permit compliance; and,
6. Financial assurance for proper plugging of injection wells upon termination of operations.

CONCLUDING STATEMENT

Both industry and the regulatory agencies have found that if the injection of wastewater is confined to suitable disposal reservoirs, wells are properly designed and operated, and injection pressures are maintained below certain limits, both ground and surface water resources are adequately protected from pollution.

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Greene, C.J., 1983, Underground Injection Control Technical Assistance Manual: Texas Department of Water Resources Rept. 238, 61 p..

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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BOB GRAHAM
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SECRETARY

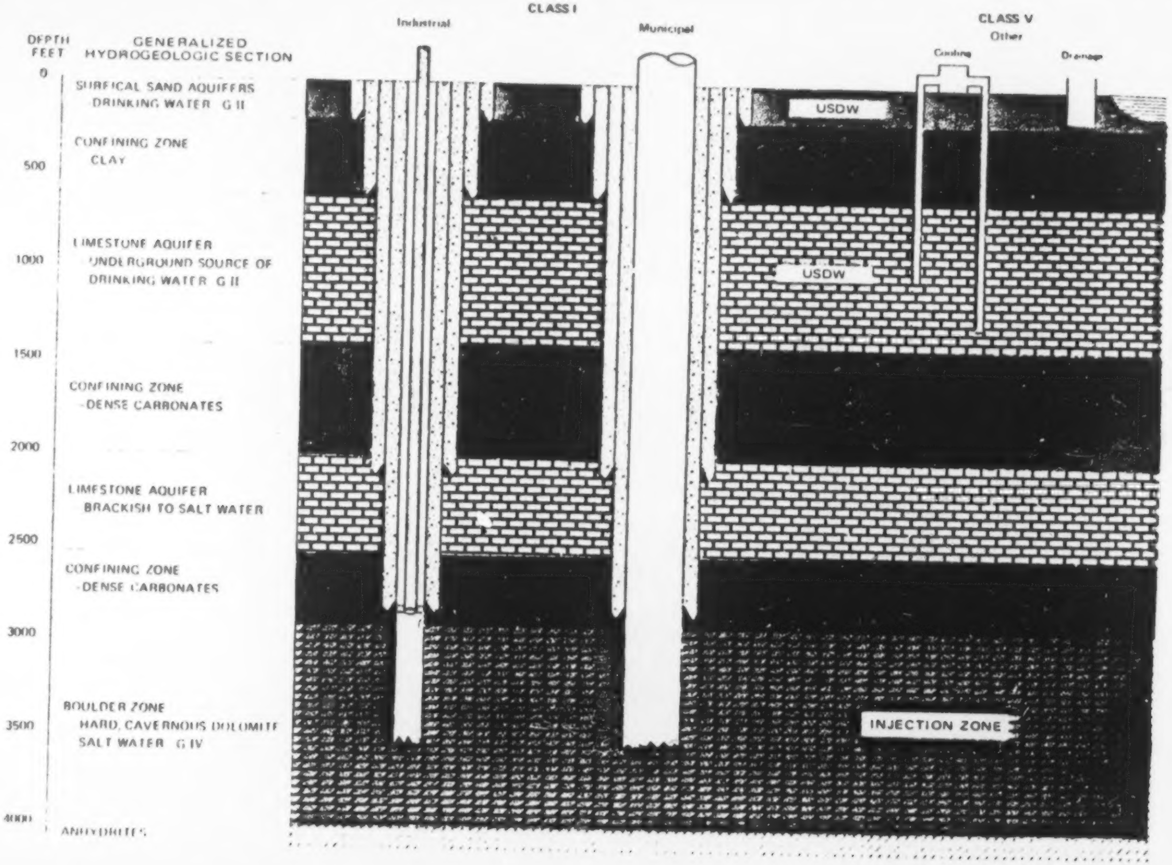
I. Overview of Florida's Underground Injection Control (UIC) Program

A. General Objectives of UIC Program

Florida is highly dependent upon ground water to supply drinking water, as over ninety percent of the state's drinking water supplies are derived from surficial aquifers and a prolific confined drinking water aquifer (Figure 1). Even in the southern regions of the state where the confined aquifer is brackish, it is used to supply reverse osmosis plants. A prime objective of Florida's Underground Injection Control (UIC) Program is to protect the quality of the state's underground sources of drinking water and to prevent degradation of the quality of other aquifers adjacent to the injection zone that may be used for other purposes. This objective is achieved by a strict state UIC rule that governs the construction and operation of injection wells to assure that the injected fluid remains in the injection zone.

The Florida Department of Environmental Regulation, which has had primacy for the UIC Program (Class I, III, IV and V wells) since February, 1983, does not encourage or promote this means of waste disposal over any other available option. An applicant for a waste disposal permit performs cost-effective and environmental analyses, and approaches the Department for conceptual approval of a particular waste disposal method. The Department evaluates each site for overall environmental

Figure 1. Location of Florida's Underground Sources of Drinking Water and Injection Zones.


CLASS I
Industrial
Municipal
CLASS V
Other
Cooling
Drainage
DEPTH FEET
GENERALIZED HYDROGEOLOGIC SECTION
0
500
1000
1500
2000
2500
3000
3500
4000
SURFICAL SAND AQUIFERS -DRINKING WATER G II
CONFINING ZONE CLAY
LIMESTONE AQUIFER -UNDERGROUND SOURCE OF DRINKING WATER G II
CONFINING ZONE -DENSE CARBONATES
LIMESTONE AQUIFER -BRACKISH TO SALT WATER
CONFINING ZONE -DENSE CARBONATES
BOULDER ZONE HARD, CAVERNOUS DOLOMITE SALT WATER G IV
ANHYDRITES
USDW
USDW
INJECTION ZONE

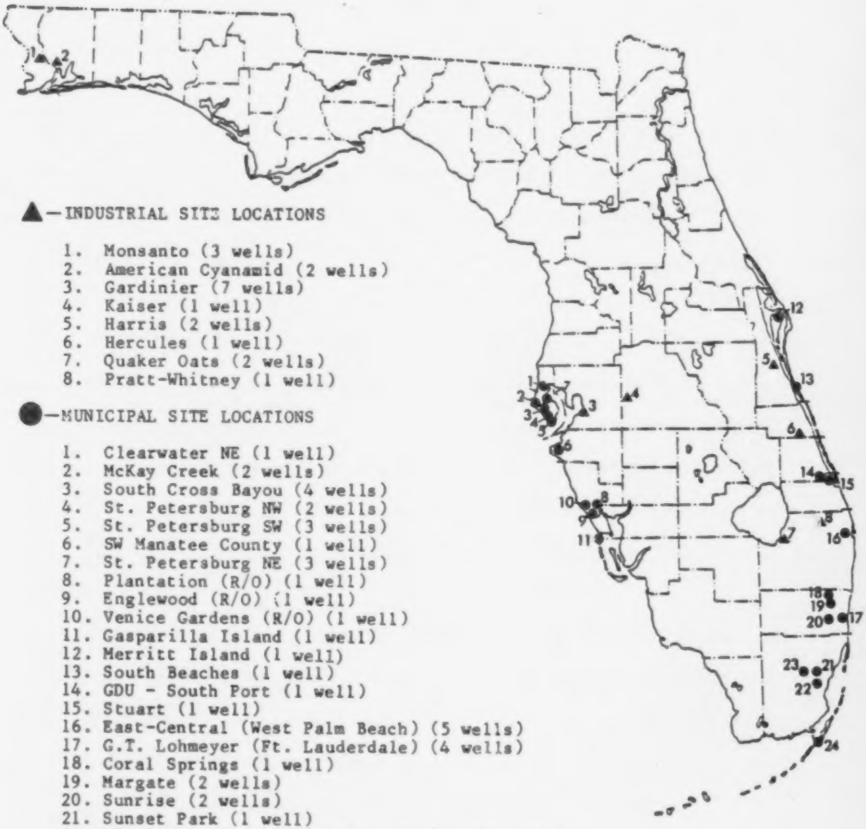
considerations, and issues permits accordingly. Figure 2 shows the locations of proposed and existing Class I wells in Florida.

Concerns regarding the UIC Program in Florida are in three areas: hydrogeologic, public perception, and well construction. A major hydrogeologic concern has been proof of the waste's effective confinement in the intended receiving zone and out of overlying underground sources of drinking water. Monitoring of overlying aquifers to detect upward waste migration has been one means of satisfying this concern. Public opposition to, and misunderstanding of, injection well systems has also been an ongoing concern. The Department maintains an aggressive public education program which includes a slide show, numerous publications, speeches and newsletter articles to help clarify the program's intent. Monitoring systems that enable an assessment of the impact of waste injection on the aquifer system are another means of allaying the public's concerns. Construction concerns center around evaluating new injection and monitor well designs with the aim of constantly improving the integrity, life expectancy and safe operation of these wells.

B. Differences between Florida and Federal Programs for Class I Wells

The Florida UIC Program may not be unique, but it is innovative in several respects. The conceptual approval and permitting of Class I wells is handled through a Technical Advisory Committee, which is composed of Department representatives, water management district representatives, EPA Region IV, and the U. S. Geological Survey. This group periodically meets during the conceptual approval, construction, testing and operational phases of an injection well system, and provides technical advice to the permitting authority. This committee also

Figure 2. Location of Permitted and Proposed Class I Municipal and Industrial Injection Wells



▲ — INDUSTRIAL SITE LOCATIONS

1. Monsanto (3 wells)
2. American Cyanamid (2 wells)
3. Gardinier (7 wells)
4. Kaiser (1 well)
5. Harris (2 wells)
6. Hercules (1 well)
7. Quaker Oats (2 wells)
8. Pratt-Whitney (1 well)

● — MUNICIPAL SITE LOCATIONS

1. Clearwater NE (1 well)
2. McKay Creek (2 wells)
3. South Cross Bayou (4 wells)
4. St. Petersburg NW (2 wells)
5. St. Petersburg SW (3 wells)
6. SW Manatee County (1 well)
7. St. Petersburg NE (3 wells)
8. Plantation (R/O) (1 well)
9. Englewood (R/O) (1 well)
10. Venice Gardens (R/O) (1 well)
11. Gasparilla Island (1 well)
12. Merritt Island (1 well)
13. South Beaches (1 well)
14. GDU - South Port (1 well)
15. Stuart (1 well)
16. East-Central (West Palm Beach) (5 wells)
17. G.T. Lohmeyer (Ft. Lauderdale) (4 wells)
18. Coral Springs (1 well)
19. Margate (2 wells)
20. Sunrise (2 wells)
21. Sunset Park (1 well)
22. Miami-Dade Sewer & Water Authority (9 wells)
23. Kendale Lakes (1 well)
24. Port Bougainville (1 well)

evaluates the entire injection well system, which includes surface equipment such as surge control tanks for water hammer control, and effluent pumping and piping systems. In addition, Florida requires a backup disposal system, which in many cases is a second well. Florida also has explicit requirements for monitoring and for monitor well construction. Efforts to establish regional monitoring systems for Class I wells have also been initiated.

More stringent and explicit requirements are the major differences between Florida and federal regulations. State regulations combine Florida's unique hydrogeology and construction practices with federal requirements to produce a regulatory program that to date must be considered highly successful. Some areas in which the state program differs from the federal program are:

(1) For Class I wells, at least one confining zone above the injection zone is required;

(2) New and unused casing is required in Class I well construction;

(3) In the design specifications of a Class I well, the applicant must address the problem of corrosion, proposed protective measure(s), and, if appropriate, proposed monitoring methods;

(4) The hole must be drilled within one degree of vertical with deviation checks every ninety feet;

(5) Testing of the injection zone must include a pumping injection test at a flow rate of not less than the maximum design capacity of the well;

(6) Minimum cement thicknesses are specified for all casing strings;

(7) No UIC permit shall be authorized where a Class I well causes or allows movement of fluid into underground sources of drinking water; and

(8) Monitoring of at least the first permeable zone above the injection zone is required.

Perhaps the greatest difference between Florida and federal regulations is in the area of monitoring. Initial reasons for requiring monitoring were that (1) injection well disposal was not a proven waste disposal method in Florida; (2) monitoring would provide data for the endless question "Where does the waste go?"; and (3) monitoring would provide greater assurances to both the regulatory agencies and the public that this was an environmentally safe means of waste disposal. Early users of injection well systems had the toughest rules applied to them, because regulatory agencies did not know what to expect. Once a data base was established that could provide these agencies with a better understanding of the effects of injection on the hydrogeologic system, monitoring requirements for newer sites could be relaxed. An unwritten standard at the time was that, at a minimum, the first permeable zone above the confining zone would be monitored to provide earliest detection of fluid migration.

There are two types of monitoring associated with injection well systems. Monitoring of the well itself, to assure that the well maintains mechanical integrity, and monitoring of the aquifer system to determine the effects of injection. There are two aspects of mechanical integrity: no leaks due to well construction and no fluid movement into an underground source of drinking water through channels outside and around the well bore. Table 1 (Vecchioli, 1979) provides a useful categorization of aquifer system monitoring wells. On-site wells are located near the injection well and monitor for upward waste migration. Satellite wells monitor the location and direction of movement of the waste front, and pressure buildup in the injection zone. Regional wells

TABLE 1. SUMMARY OF WASTE INJECTION MONITORING CONCEPTS

Type of Monitoring	Purpose	Type of Measurements
Injection facility	Facility integrity and performance	Injection pressure Injection rate & volume Annulus pressure Fluid quality
Aquifer system:		
On-site well (few to tens of feet)[1]	Upward migration	Aquifer head Water quality
Satellite well (hundreds to several thousands of feet)[1]	Pressure distribution Position of waste liquid Fate of waste liquid	Aquifer head Water quality
Regional well (miles)[1]	Pressure distribution Salt-water interface displacement	Aquifer head Water quality

[1] Refers to distance from individual injection wells.

Vecchioli, J., 1979, Monitoring of Subsurface Injection of Wastes, Florida: Ground Water, v. 17, no.3, p. 249.

monitor pressure changes in the receiving aquifer from the operation of two or more injection well systems.

A significant difference exists between Florida and federal requirements for mechanical integrity testing involving monitoring of the injection well itself. The philosophy that evolved in Florida's regulatory agencies prior to a specific rule governing underground injection was one of overdesign and redundancy to protect against construction leaks. This conservative approach was necessary because adequate means for mechanical integrity testing did not exist. It was not possible to conduct a reliable pressure test (which tests for leaks) on a large diameter injection well. In addition to strict design considerations, the regulatory agencies required monitor wells to compensate for the unavailable technology for pressure testing in large diameter injection wells. To determine absence of fluid movement outside the well bore, the second aspect of mechanical integrity testing, federal regulations only require a temperature or noise log. In addition to these logs, Florida requires monitoring of adjacent overlying aquifers, and the option of radioactive tracer surveys. These additional requirements were necessary because of difficulties in obtaining reliable and useable data from the temperature and noise logs.

Florida's current requirements for monitoring of the aquifer system are more explicit than the federal requirements. Our rule states that the Department may require monitor wells above and in the injection zone near the injection well, field or project. If the applicant does not propose monitor wells he must demonstrate that they are not needed. In practice this has resulted in monitoring of at least the first permeable zone above the required confining zone overlying the injection zone. All Class I well sites in Florida have monitoring wells. Construction and testing standards for monitor wells may be as strict as those for Class I wells, and are detailed by state regulation. The most common method of monitoring is a separate, on-site well monitoring the first permeable zone and another higher permeable zone. On-site monitoring in the injection zone is no longer a common practice.

Florida also specifically requires that the background water quality of the injection zone and the monitoring zone(s) be established prior to injection. Monitoring parameters are established on a case-by-case basis. In addition to continuous monitoring of injection pressure, flow rate, volume and annular pressure, as required by federal regulations, the state may also periodically require a controlled injection test or bottom-hole pressure survey, if a long-term trend of increasing injection pressure is indicated.

Florida also requires some baseline mechanical integrity monitoring of the injection well itself. A video television survey is run inside the final string of casing from the surface to the bottom of the injection zone, prior to injection in those wells where it is physically possible to do so. This survey can prove quite useful if later problems with the well develop.

Amendments to the state rule are underway. Proposed monitoring amendments will probably address new monitor well designs not in existence at the time of rule development, annular monitoring in the injection well, and another attempt to require regional monitoring.

C. Case Histories of Monitoring Well Programs

1. Class I Industrial Well, Escambia County. The Monsanto Corporation injection and monitoring well system is one of the best examples of how monitoring can provide assurance that the underground sources of drinking water are not endangered by injection well disposal. This northwest Florida site has injected industrial acidic waste into the lower limestone of the Floridan aquifer since 1963 (Figure 3). The hydraulic gradient in the injection zone is to the southwest.

Currently three injection wells (one standby), two on-site monitor wells, two satellite wells (1.5 miles south and 1.9 miles north of the injection wells) and three upgradient regional monitor wells comprise the injection well system. No pressure increases or water quality changes have been observed in wells monitoring the first permeable zone above the confining zone, indicating that the waste has been effectively confined in the intended receiving zone. However, static pressures in the injection zone have dramatically increased since injection began. Pressure and water quality data from the two satellite monitor wells have enabled a reasonable calculation of the position of the waste front at any given time. Data from regional monitor wells enabled calculations of radial pressure effects from waste injection, and predictions on the displacement of the fresh water/salt water interface in the injection zone.

2. Class I Municipal Well, Pinellas County. An elaborate water reuse system was planned at the St. Petersburg Southwest Wastewater Treatment Plant incorporating urban spray irrigation of secondary sewage effluent

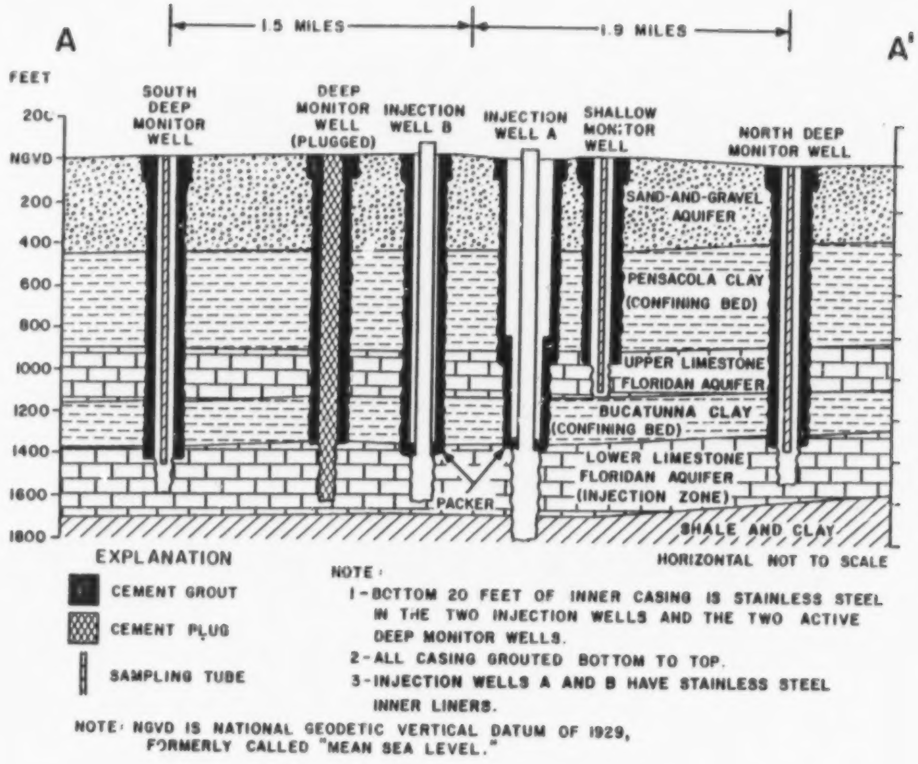

A
1.5 MILES
1.9 MILES
A'
FEET
200
NGVD
200
400
600
800
1000
1200
1400
1600
1800
SOUTH DEEP MONITOR WELL
DEEP MONITOR WELL (PLUGGED)
INJECTION WELL B
INJECTION WELL A
SHALLOW MONITOR WELL
NORTH DEEP MONITOR WELL
SAND-AND-GRAVEL AQUIFER
PENSACOLA CLAY (CONFINING BED)
UPPER LIMESTONE FLORIDAN AQUIFER
BUCATUNNA CLAY (CONFINING BED)
LOWER LIMESTONE FLORIDAN AQUIFER (INJECTION ZONE)
PACKER
SHALE AND CLAY
HORIZONTAL NOT TO SCALE
EXPLANATION
CEMENT GROUT
CEMENT PLUG
SAMPLING TUBE
NOTE:
1-BOTTOM 20 FEET OF INNER CASING IS STAINLESS STEEL IN THE TWO INJECTION WELLS AND THE TWO ACTIVE DEEP MONITOR WELLS.
2-ALL CASING GROUTED BOTTOM TO TOP.
3-INJECTION WELLS A AND B HAVE STAINLESS STEEL INNER LINERS.
NOTE: NGVD IS NATIONAL GEODETIC VERTICAL DATUM OF 1929, FORMERLY CALLED "MEAN SEA LEVEL."

Figure 3. Hydrogeologic Section and Schematic Profiles of Wells, Monsanto Corporation (after Hull and Martin, 1982).

as the primary disposal means, and deep well injection as backup disposal in order to provide zero discharge to surface waters. When this project was proposed in 1976, the regional water management district was hesitant to give unconditional approval, because "it has not been adequately demonstrated that the deep well injection as proposed will not result in significant adverse effects upon the water resources of the district." Consequently a 32-month injection-testing period was mandated.

Three injection wells and twelve monitor wells were planned for this site (Figure 4). All monitor wells were on-site, and were either of single or multi-horizon completion. During the 32-month period of injection testing, extensive monitoring data were obtained. The data confirmed that with the exception of one monitoring well (which had some construction problems) the injected fluid was retained in the injection zone below 750 feet.

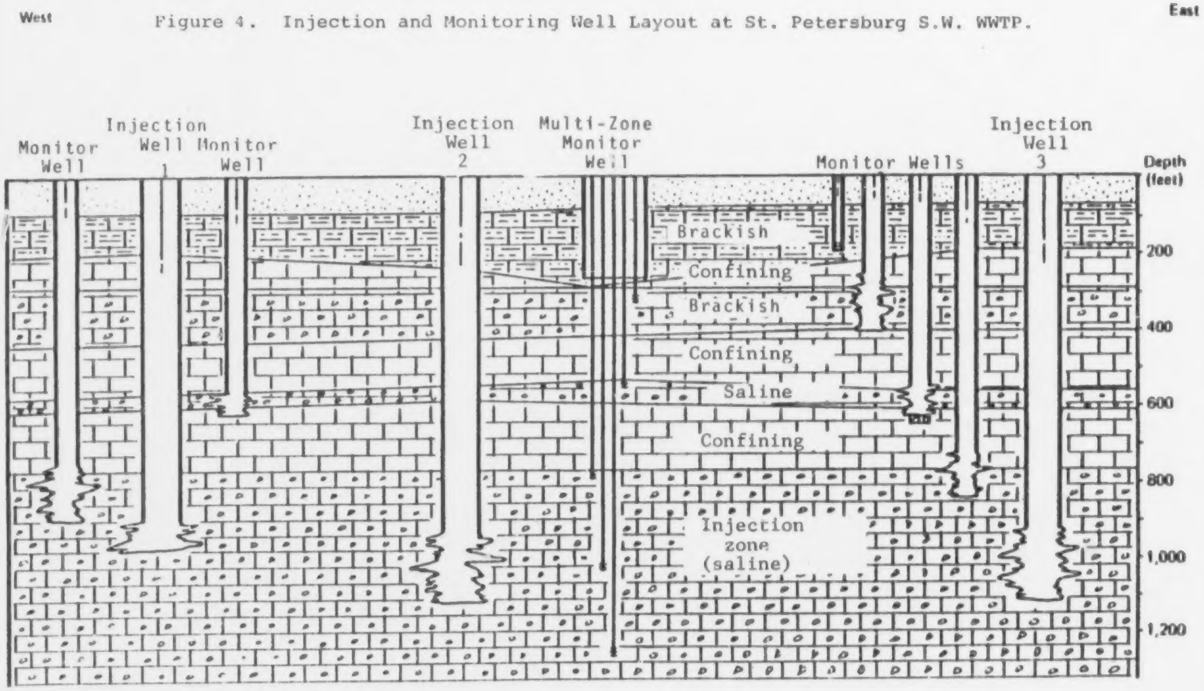
Monitoring will continue to be an essential part of allowing disposal through injection wells in Florida. As our knowledge increases and we learn from previous mistakes, we will refine and improve our approach to monitoring. New monitor well designs are carefully scrutinized and will be incorporated into the state rule amendments if the design represents an improved technology.

II. Suggested Changes to Bill S.2649

A. Florida's Position on Sec. 1426 - Restrictions on Hazardous Waste Injection

The Florida Department of Environmental Regulation fully supports this proposed amendment. During the development of the state Underground

Figure 4. Injection and Monitoring Well Layout at St. Petersburg S.W. WWTP.


West
East
Monitor Well
Injection Well 1
Monitor Well
Injection Well 2
Multi-Zone Monitor Well
Monitor Wells
Injection Well 3
Depth (feet)
200
400
600
800
1,000
1,200
Brackish
Confining
Brackish
Confining
Saline
Confining
Injection zone (saline)

Modified from CH2M HILL

Injection Control Rule, it was recognized that the hydrogeology of Florida was not suitable for hazardous waste injection through Class IV wells. The federal regulations banned direct injection of hazardous waste into an underground source of drinking water, but allowed it above an underground source of drinking water. Florida's hydrogeology essentially guarantees that injection above an underground source of drinking water would essentially be equivalent to direct injection into an underground source of drinking water. Consequently, in 1981 the Department sought Governor and Cabinet approval to ban all injection of hazardous waste both into and above any underground drinking water source.

The 1983 Legislature banned the disposal of hazardous waste through all new injection wells. Facilities holding construction permits for Class I wells injecting hazardous wastes could complete their wells, but no new wells could be constructed after June 1, 1983.

B. Florida's Position on Sec. 1427(a)(2) - Monitoring

Florida supports the intent of this proposed amendment, but finds the wording too restrictive and ambiguous to be applicable on a national basis. One objection is the use of the word "downgradient". The case histories presented today demonstrate that the most appropriate placement of a monitor well is not always downgradient from an injection well. In south Florida, the effects of the negligible gradient are thought to be overridden by the buoyancy effect; thus, monitor well placement is often a function of surface features and property constraints. Our second objection is related to the implication that all underground drinking water sources need to be monitored. Downgradient monitoring of all underground sources of drinking water may not be the most cost-effective or efficient means of tracking injected waste movement. Alternatively, monitoring the first permeable zone overlying the injection zone, whether or not it is an underground source of drinking water, provides an early detection system for the upward migration of injected fluid. A broader monitoring requirement such as the following would provide flexibility for site specific, cost-effective monitor well placement, and would be easier for the states to implement:

"(2) Monitoring associated with Class I wells to provide the earliest possible detection of fluid migration into, or in the direction of, underground sources of drinking water."

C. Florida's Position on Sec. 1247(b)

Florida does not support this proposed amendment. A comprehensive water resources assessment at a given location may determine that the most reasonable and beneficial use of ground water meeting the criteria specified in 40 CFR Section 146.04(c) would be for waste injection. States should continue to have the flexibility to make this assessment on a case-by-case basis.

III. Comments on Existing UIC Federal Regulations

The existing federal UIC regulations provided an excellent base for state regulations and programs. However, the greatest problem Florida has had in implementing these regulations has been with Class V wells. Great care was taken to develop sound construction, operation and monitoring requirements for Class I wells, to insure against the migration of injected waste into drinking water source aquifers. Yet Class V wells conduct the identical waste (excepting only hazardous waste) directly into an underground source of drinking water, without the benefit of prior mixing, dilution, and geochemical alterations. The only pre-injection water quality criteria that have to be met are the primary drinking water standards and a general prohibition against adversely affectng the health of persons. Since Class V wells are much less expensive to construct and operate than Class I wells, Florida experienced a rush of Class V well applications (primarily to inject domestic sewage) after the UIC Program went into effect. Strict state water quality criteria killed most of these projects, but the point to be made is that the next refinement of the UIC regulations should concentrate on more detailed construction and water quality standards for Class V wells.

Other possible areas for refinement might include:

(1) Specific alternate tests for mechanical integrity where pressure tests, temperature logs and noise logs are inconclusive;

(2) Specific requirements for a confining zone(s) above the injection zone for Class I wells;

(3) An approved back-up disposal method prior to issuance of a construction permit for a Class I well;

(4) Consideration during permit review of effluent pump systems and surge protection; and

(5) Permitting guidelines for Class V wells.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 29, 1984

Ms. Heather Wicke
U. S. Senate Committee on
Environmental & Public Works
Senate Hart Office Building #408
Washington, D.C. 20510

Dear Ms. Wicke:

Enclosed are my written responses to the questions we did not have time to complete at the hearing. Please let me know if you need any additional information on these issues.

I enjoyed working with you on this project and hope that some tangible results occur this year.

You and other staff and subcommittee members have a standing invitation to visit injection wells in Florida. A week's notice would be ideal. However, for your proposed trip to Tallahassee to discuss ground water issues with Dr. DeHan, a longer notice would probably be necessary.

Sincerely,

Leslie Bell

Leslie Bell
Environmental Supervisor
Groundwater Section

LB/cs

Enclosure

cc: Dr. Rodney S. DeHan

1) At the first hearing on Safe Drinking Water Act amendments, we heard the public water supply representatives express the view that well operators be required to notify public water supply systems of the location of any wells that might affect their water supply in the event of a leak.

- Is this information made available to water suppliers in your States?

Injection well operators are not required to specifically notify public water supply system owners of the existence of their wells. However, two mechanisms exist where the owner of a public water supply system can learn of nearby injection well systems.

A permit applicant is required to publish one time only in a local paper the Department's Notice of Intent to Issue or Deny the application. The general public is invited to inspect the application and to attend a scheduled public meeting.

The second mechanism is a two-part requirement in the state UIC rule concerning public recording of an injection well's existence. Before a new well can get an operating permit, proof must be provided that the existence of the well has been recorded on the surveyor's plat at the county courthouse. After an existing injection well has been properly abandoned, evidence such as a sealed copy or certification from the county clerk that the location of the abandoned well(s) has been recorded in the county courthouse property records, must be provided to the Department.

- Could such a requirement be effectively incorporated into a state program - say as another condition of a permit?

It would be possible to have a specific permit condition requiring the injection well applicant to notify all public water supply systems within the area of review.

2) You've specified a number of Florida program requirements in your testimony different from the Federal regulations. I am interested in the basis for these state requirements in terms of additional safeguards.

First, the requirement that new and unused casing be used in Class I construction. This seems like it would be a minimum Federal requirement.

Minimum Federal construction standards for Class I wells state that casing used in the construction of each newly drilled well shall be designed for the life expectancy of the well (40 CFR 146.12(b)). The state UIC rule includes the same criteria with the additional requirement that the casing be new and unused for Class I wells. Most Class I wells will be in operation for 20 or more years and hazardous waste will be injected in some of these wells. The Department believes that used casing would not provide adequate protection, as the chemical and structural integrity of the recycled casing can not be guaranteed. Nor can the Department assume that all applicants will use new and unused casing.

New pipe for casings is generally certified to meet certain physical and chemical characteristics. Used pipe dealers, however, can only notify users of the pipe's original characteristics-not its current chemical and physical state. The integrity of used pipe could be adversely affected by scale and pitting, resulting in possible collapse of the casing.

- Has Florida had problems in this regard?

I do not know of any recent problems resulting from used pipe. During state rule development, the issue of new and unused pipe arose as one more safeguard to insure the integrity and longevity of the well.

- Do the Federal regulations require integrity checks of used Class I well materials?

There is no federal requirement for specifying integrity checks of used Class I well materials, but used casing is not specifically addressed anywhere in the federal regulations.

3) Next, the requirement that the applicant must address the problem of corrosion in the design phase. Dr. Pirages indicated that operators analyze the waste fluid and make determinations of compatibility with well materials and the geologic formation.

- Could you elaborate on the need for addressing corrosion in the design phase?

The Department wanted to ensure that the engineer had considered possible corrosion and had incorporated protective measures in the design. Corrosion of the inside of the injection string from the waste fluid and corrosion of the outside of the casings from salty aquifer waters can occur. Consequently the consultant should analyze the type of steel, the waste, and formation fluids to determine corrosion potential. Minimum cement thicknesses are required (to protect outsides of casings) but the consultant may also propose measures such as epoxy resin coatings on the inside or outside of casings, steel coupons or buttons with a known initial thickness, minimum casing thickness based on corrosion rate in a given environment, specifying certain cement types compatible with native fluids (i.e., sulfate resistant cements), geophysical logs measuring casing thickness, television surveys and pressure tests.

4) Finally, no UIC permit shall be authorized where a Class I well causes or allows movement of fluid into underground sources of drinking water.

- Isn't this also a Federal requirement?

The 1980 version of the federal UIC regulations stated "No UIC authorization by permit or rule shall be allowed ... where a Class I well causes or allows movement of fluid into underground sources of drinking waters." This stringent "no migration" requirement was challenged in the 1981 lawsuit, and consequently EPA amended the "no migration" standard to one of "adequate protection" of underground sources of drinking water. The same provision now reads "No authorization by permit or rule shall allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons."

When the Department had to amend the state UIC rule to incorporate federal amendments resulting from the lawsuit, the decision of the UIC Rule Technical Advisory Committee was to retain the original, more stringent "no migration" language for the state.

5) I am very pleased that we have two state program administrators with us today since we can learn more about the site-specific nature of waste injection by comparing the similarities and differences between your program requirements. I wanted to have this type of interaction on the issue of monitoring.

I would like both of you to explain the discrepancy in your views on monitoring. That is, why does Florida find it beneficial to require monitoring even with its stable geology and Texas has the position that it is not sufficiently effective to provide additional security benefits?

Use of injection wells for disposal of large volume (3-100 million gallons per day) of sewage effluent is rapidly becoming a popular and cost-effective disposal alternative in Florida. For the period

1959-1983, total volume of secondary sewage injected into southeast Florida alone is approximately 107 billion gallons. If injection wells are the primary disposal means, the inherent danger is that, unlike industrial waste production, sewage "production" can not be shut down if the primary disposal means fails or loses integrity.

Since the trend in Florida is toward increasing reliance on Class I injection wells, and the injection zone is in close proximity to the underground source of drinking water, regulatory agencies have adopted a protective philosophy that incorporates monitoring wells as the principal mechanism for achieving that protection.

All aquifers, whether or not they are potable, are considered a public resource that the Department of Environmental Regulation is charged with protecting. The Department must also determine and preserve the most beneficial use of the state's aquifers. The non-potable aquifers used for injection may be considered a public resource that is being developed. As development pressure increases (with increased total volume injected) the potential for damage to overlying potable aquifers, which are also the Department's responsibility, also increases. The Department has long adopted the idea that monitoring would help satisfy the agency's responsibilities of aquifer protection.

The stability of Florida's geology is not a factor in the decision to require monitoring, but is a factor contributing to the proliferation of injection well systems in Florida. However, the characteristic of Florida's geology that allows low-pressure injection, which is cavernous formations with extremely high transmissivities, is also a strong reason for monitoring. Cementing through zones of high transmissivity can be tricky. Monitoring outside the injection well bore provides some assurance about the integrity of the confining zones and the effectiveness of the cement job.

Finally, this waste disposal practice generates alot of public concern and sometimes public opposition. The prevailing public concern seems to center around uncertainty over the direction and rate of waste movement, and the ultimate fate of the waste body. Carefully planned monitoring programs will eventually help provide more definitive answers to these concerns.

6) 1. You stated in your testimony that "efforts to establish regional monitoring systems for Class I wells have been initiated."

- Briefly describe the purpose and method of such a regional monitoring network.

A regional monitoring well network is established to determine the effects of injection from two or more facilities on the regional underground sources of drinking water. One regional monitor well network has been in place for 8 or 9 years in northwest Florida. Regional monitor wells located up to 33 miles from one of the industrial injection wells have provided data indicating that pressure buildup from injection is restricted to the injection zone and has not impacted the overlying drinking water sources.

Another regional monitoring network has been planned (and funded with 201 monies) as part of the Central Pinellas 201 Facilities Plan. The purposes of this network are:

> "1) To observe water quality changes due to the combined influence of injection facilities throughout the County. These observations will be used to refine the predictions of lateral migration of effluent.
>
> 2) To provide "early warning" protection against contamination of public water supplies throughout the County, due to unanticipated migration of injected fluids.
>
> 3) To observe the impact of the injection on the location (possible adverse movement) of the freshwater/saltwater interface." [1]

The location of the effluent fronts, the location of the interface points of the waste fronts, and the arrival times were calculated to determine the siting for the regional monitor wells.

- Is Florida considering these systems as a requirement in some cases?

The state UIC rule is currently being amended. One of the topics we will reopen is that of regional monitoring. During initial rule development, there were so many financial and other considerations that the only requirement in the rule concerning regional monitoring is as follows:

> "The Department may request that the applicant provide, in addition to site specific and area of review information, regional information that will allow prediction of the regional impact of the proposed injection well."

[1] Miller, J. C. and M. D. Micheau. 1982. Comprehensive Monitoring Program of Deepwell Injection Pinellas County, Florida. Water Pollution Control Federation 55th Annual Conference.

The proposed amendment to this general requirement is "Such a request for regional information may include the construction and long term operation of one or more regional monitor well(s)." However, the same difficulties with implementing a regional monitor well requirement still exist and may preclude passage of a stricter regional monitoring requirement. These difficulties include purchase and acquisition of off-site land, and determination of equitable financial responsibility when all users did not start injecting at the same time.

2. You stated on p. 6 of your testimony that early applicants had the toughest rules applied to them with respect to monitoring and once a data base was established monitoring requirements could be relaxed.

- Currently, is monitoring of the overlying underground source of drinking water required in all cases?

Monitoring of the overlying underground source of drinking water is not required in all cases. As explained in my testimony, the Department is more concerned with monitoring the first permeable zone above the injection zone.

There is one case where monitoring of the underground source of drinking water is always required. If the injection well is being drilled through a surficial aquifer with potable water, the driller must install shallow monitoring wells around the drilling pad to monitor for spills during construction.

- How does an applicant go about showing monitoring is not needed?

To date an applicant has not been able to establish with a reasonable degree of certainty that monitoring is not needed. An applicant might be able to convince the Department that monitoring was not needed if he had proposed a well in close proximity to existing wells with associated monitoring wells.

3. Part of the argument against outside-the-well monitoring is that the technology is not sufficiently effective. I am interested in whether or not Florida's monitoring requirement has driven technological innovation and improved monitoring methods?

Florida's monitoring requirement has certainly driven technological innovation. The prime motivation has been to find a monitor well design that is less expensive to construct yet still satisfies the requirements. Whether these new designs represent an improved method will require a test of time. Some of the designs were approved by the Department with the understanding that if the monitor well failed or did not last as long as anticipated, the permittee would have to replace it.

Some of the monitoring concepts proposed since initial rule promulgation will be proposed as possible amendments.

Written Statement of
Charles R. Sherman
Senior Consultant

E.I. Du Pont De Nemours and Company
(Du Pont)

Before the
Senate Subcommittee on Toxic Substances
and Environmental Oversight

Environment and Public Works Committee

On

S 2649 - Safe Drinking Water Act
Amendments of 1984

June 26, 1984

E. I. du Pont de Nemours and Company (Du Pont) appreciates the opportunity to appear as a witness at the June 26, 1984 hearing regarding the provisions of S. 2649. Du Pont will confine its remarks to those provisions of the Bill which address underground injection or deep wells. Specifically, we will focus on Section 9 (a) of S. 2649 proposing a new Section 1427 - Regulation of State Programs, to Part C of the Safe Drinking Water Act (SDWA).

The portion of proposed Section 1427 which Du Pont is deeply concerned about and troubled by is Subsection (a) (2):

> "(a) No later than 18 months after enactment, the Administrator shall revise regulations issued under this Act to require the following:
>
> (2) Monitoring of underground drinking water sources down gradient from a Class I injection well."

Du Pont began operating deep wells in the early 1950's and currently operates 37 underground injection wells permitted under the Federal Underground Injection Control (UIC) regulations and/or similar state regulations. The design, construction, operation, monitoring and closing of our deep wells emphasizes a primary concern for protecting the environment. No one's drinking water has ever been contaminated due to Du Pont's deep well operations. With over 30+ years of experience in operating deep wells, we believe the above proposed mandatory "monitoring" requirement for all Class I injection wells would be overly burdensome and, based on technical and economic considerations, is not justified. We believe that monitoring wells should only be required in limited, unique situations. There currently exist more effective methods (Discussed in detail beginning on page 6) to accomplish the Ground Water Protection objectives embodied by this proposed requirement.

The remainder of our comments will present a brief description of what is involved in siting, constructing and monitoring a deep well. We will specifically address the need for requiring "monitoring of underground drinking water sources down gradient from a Class I injection well", and elaborate on our position that such monitoring wells are only necessary in limited, specific situations.

Introduction

Du Pont operates 37 underground injection wells in the following states: Texas, Mississippi, Louisiana, Kentucky, Tennessee, and West Virginia. Twenty-seven (27) of these wells are classified under the UIC regulations as Class I hazardous waste wells; the remaining wells inject non-hazardous waste. The wastes which Du Pont injects are acidic wastes (nitric, hydrochloric, ferric chloride and dilute acetic) and aqueous organic brines. Injection rates range from 100-500 GPM with injection pressures typically in the 50-500 psig range. Our deep wells range in depth from 2500 to 10,000 feet with most wells between 3000 and 6000 feet deep. The four basic rock strata into which we inject are sand, sandstone, dolomite and shale. The ground waters in these formations are saline and non-usuable.

Du Pont selected deep wells for disposing of these various streams because alternative treatment technologies are either technically impractical, prohibitively expensive or involve significant environmental risks not encountered with underground injection. For example, surface neutralization of the inorganic acid streams would create massive amounts of inorganic sludge requiring landfill disposal. The neutralized liquid, as well as the treated aqueous/organic brine streams, contains very high concentrations of salts which preclude their direct discharge to surface streams.

Selection of Deep Well Disposal Site

All of Du Pont's deep well disposal sites are selected only after thorough and exhaustive geological and hydrological studies confirm that conditions are indeed appropriate for the particular application contemplated. These studies consist of reviewing existing USGS data, state and local information, any oil and gas well logs in the area, and, if necessary, surface geophysical studies. It is sometimes necessary to drill an exploratory well to obtain specific geologic and hydrologic data in order to decide if the site is appropriate. Considerations which must be addressed to determine if a site is a viable candidate for underground injection include:

- Is the waste capable of being deep well disposed? Is the waste compatible with the disposal zone fluid and formation?
  - The waste cannot be of a nature which causes the zone to close up, and it should not contain particles or react to form particles which will clog the formation.
  - Waste/injection formation compatibility studies are essential.
- Is the proposed disposal zone capable of accepting the injected wastes? (Receptivity)
  - Does the disposal zone have sufficient space available to accept the wastes?
- Is the disposal zone isolated from zones above so that potentially usable aquifers are adequately protected by impermeable geological formations which prevent upward migration of injected wastes or formation fluids?
- Is the area in question geologically stable?
- Are the proposed disposal formations economically unusable for other purposes?

Du Pont believes that a successful deep well disposal system depends on a geologically suitable formation, liquid waste and disposal formation compatibility; and proper design, construction, operation, monitoring and closing of injection wells. The key features of Du Pont's deep well evaluation studies focus on geological considerations and waste compatibility.

Geological Considerations - The key geological features are:

- The disposal formation must have sufficient porosity, permeability and areal extent to accept wastes at practical injection rates and pressures.
- The disposal formation must be confined by geologic formations which prevent vertical migration and insure permanent isolation of the injected wastes and formation fluids.

Additional geologic factors which Du Pont considers in order to determine formation suitability are:

- Natural fluid pressure and temperature in the injection zone.
- Earthquake potential which my result in waste migration along faults.

Du Pont considers the following for each site: ground water studies to identify potential underground sources of drinking water - USDWs (water-bearing stratum of permeable rock, sand or gravel) which must be protected; geophysical logging (the determination and identification of subsurface conditions), coring and core analyses, formation fluid sampling, formation pressure measurements and injection tests, location of old wells which penetrate the disposal zone and the adequacy of their plugging (Du Pont has re-plugged several old oil and gas wells).

Waste Compatibility - Injected wastes must be compatible with the disposal formation. Du Pont conducts tests on the physical and chemical characteristics of the waste, the disposal formation, and the formation fluids to determine the injection capacity for a particular waste. Adverse physical and chemical interactions can lead to plugging of the formation. Liquid waste/disposal formation compatibility tests are typically performed at temperatures equivalent to actual disposal formation temperatures to determine if insoluble or suspended particles (precipitates) are produced.

Deep Well Construction*

Du Pont's deep well disposal facilities contain three (3) main features: injection well, surface equipment and monitoring facilities.

Injection Well

Casing - A deep well usually consists of a number of strings of casing--conductor casing, surface casing, protective or inner casing, and injection tubing. Conductor casing is used near the surface when the action of drilling muds and equipment would create erosion problems due to the instability of the surface soils. Surface casing is used principally to protect freshwater aquifers. Protective (inner) casing extends from the ground surface to the top of the disposal zone. Both casings (surface and protective) are cemented in place from the bottom of the casing back to the surface. The protective casing forms the outer surface of the annular area between it and the injection tubing. The bottom portion of the protective casing, injection tubing, mechanical seal and other parts of the well which convey waste to the disposal zone are constructed of waste resistant materials. The injection tubing is the pipe through which the liquid waste is injected. Casing lenghts vary depending on the character of the rock formation (lithology) and depth of the well.

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*See attached CMA Brochure entitled - "Deep Well Disposal - An Option for Responsible Management of Chemical Wastes", pages 8-9.

Seals - Seals isolate the space between the injection tubing and the protective casing (annulus) from the disposal formation. Liquid waste may be injected through a mechanical seal (packer) set between the injection tubing and the protective (inner) casing. The annulus is filled with brine, oil, or other non-corrosive fluids to balance the internal pressure in the injection tubing. Annulus pressure is monitored to detect any leaks in the inner tubing or packer. A fluid seal may also be used instead of a packer. In a fluid-sealed well, the annulus liquid is lighter in density than the liquid waste and thus floats over the injected waste. The resultant interface between the two liquids produces a similar effect as a mechanical seal.

Cement - Various cements are used to bond the casing to the wall of the hole. Cementing protects the casings from external corrosion from subsurface waters, increases casing strength, prevents mixing of fluids from the various formations penetrated by the bore hole, and prevents liquid wastes from entering strata other than the disposal formation. For additional safety precautions, all casings are cemented throughout their entire length.

Surface Equipment

Surface equipment requirements depend on the nature and amount of waste to be handled and on the pretreatment requirements prior to waste injection. Equipment used includes injection pumps, pressure detection instrumentation, flow and pressure alarms, waste collection and storage facilities, filtration and treatment facilities.

Monitoring Facilities

Monitoring of deep well installations provides continuous performance data on the well operation and the condition of its components. Typical monitoring parameters include:

- Injection rates and pressures
- Annular fluid (pressure monitoring detects well casing, packer and tubing failures).

In addition, periodic analysis of the injected waste are obtained.

Properly operated deep wells are regularly inspected using instrumentation designed to detect problems before they become unmanageable and serious. Also, wells are monitored by periodic "mechanical integrity" inspections. These inspections reveal the structural integrity of the well components as well as the cement seal placed behind the protective casing.

Construction, Operation and Monitoring Requirements

EPA's UIC regulations (40 CFR 146) impose stringent construction and operating standards and require extensive monitoring for deep well disposal operations. The construction, operating and monitoring requirements for Class I wells are contained in 40 CFR 146.11-146.15. Class I disposal wells are:

"(1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter (1/4) mile of the well bore, an underground source of drinking water.

"(2) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water." (40 CFR 146.05 [a])

Construction Requirements (40 CFR 146.12) - EPA requires that all Class I wells be sited such that waste injection is beneath the lowermost formation containing an underground source of drinking water. The minimum information required on the injection formation for new Class I wells is: fluid pressure, temperature, fracture pressure, physical and chemical characteristics of the injection matrix and physical and chemical characteristics of the formation fluids. Casing and cementing of the disposal well must prevent the movement of fluids into or between USDWs. Factors involved in the selection of the appropriate casing and cementing materials and techniques include: (1) depth to injection zone; (2) injection pressure, external pressure, internal pressure and axial loading; (3) hole size; (4) size and grade of all casing strings (e.g., wall thickness, diameter, nominal weight, length, joint specification, and construction material); (5) corrosiveness of injected fluids, formation fluids, and temperatures; (6) lithology of injection and confining intervals; and (7) type or grade of cement. Either a packer set immediately above the injection zone or a tubing with an approved fluid seal is required for all industrial Class I injection wells. Specifications for tubing, packers or alternative facilities must consider the following factors: (1) depth of setting; (2) characteristics of injection fluid (chemical content, corrosiveness and density); (3) injection pressure; (4) annular pressure; (5) rate, temperature and volume of injected fluid; and (6) the size of the casing. Appropriate tests and analyses must be conducted during the drilling and construction of the Class I wells and a comprehensive report interpreting the test results must be submitted to the appropriate regulatory agency.

Operating Requirements (40 CFR 146.13[a]) EPA's monitoring requirements specify that, except during stimulation, injection pressures must not exceed a maximum pressure which has been calculated to assure that injection does not initiate new fractures or propagate existing fractures in the injection zone. Injection pressures must not initiate fractures in the confining zone or cause movement of injection or formation fluids into an underground source of drinking water. Injection between the outermost casing protecting USDWs and the well bore is prohibited. For wells sealed at the bottom with a mechanical packer device, the annulus between the tubing and the casings must be filled with a fluid approved by the appropriate regulatory agency. Typical annulus fluids are inhibited (corrosion inhibitor) brines and kerosene. A specified pressure or pressure range, which also must be approved, must be maintained on the annulus.

Monitoring Requirements (40 CFR 146.13[b]) EPA's monitoring requirements include analyses of the injected fluids with sufficient frequency to obtain representative data of the waste characteristics. Continuous recording devices must be installed to monitor injection pressure, flow rate and volume and the pressure on the annulus between the tubing and the casings. Mechanical integrity of the injection well and system must be demonstrated at least once every five (5) years during the life of the well. The Agency requires that when other wells in the area of review (or area of influence) of the injection well are to be used as monitoring wells, the type, number and location of these wells must be specified. These wells are used to monitor any migration of fluids into and pressure in the underground sources of drinking water. The parameters to be measured and the frequency of monitoring must also be specified.

Monitoring of Injection Wells

As discussed above, EPA's UIC regulations require monitoring of the annulus pressure during the operation of the underground injection wells. This annulus pressure monitoring will enable the operator to determine if there are problems with the integrity of the various casings, injection tubing or bottom seal of the well (e.g.,packer). Detection of pressure differences outside of the normal operating range will indicate a potential problem "leak". For example, Du Pont operates its injection wells such that the pressure on the annular fluid is approximately 50-100 psig higher than the injection tubing pressures. The normal range for injection pressures in Du Pont's injection wells ranges from 50-500 psig, although some wells operate as high as 1000 psig. By maintaining a positive pressure differential between the annular fluid and the injection tubing, if a leak does occur in the injection tubing, then annular fluid will leak into the injection tubing, rather than waste leaking out of the tubing. This prevents the waste from coming into contact with the protective casings and potentially causing structural integrity problems, e.g., corrosion of the casing. If a leak developed in the casing, then annular fluid would leak out, not waste. A leak in the bottom seal will allow annular fluid to escape into the injection formation. Du Pont operates its injection wells such that whenever pressure differences outside the normal operating range are encountered during continuous monitoring of this system, the injection wells are promptly taken out of service until the source of the "leak" can be identified and corrected.

Du Pont believes that the mechanical integrity of a well is demonstrated if there are no significant leaks in the tubing, casing or packer. Because a very small amount of annular fluid will normally escape the system due to minor valve leaks, pump seal losses, minor losses where the tubing sections are joined (e.g., 30-foot sections at a depth of 2500 to 10,000 feet) and evaporation from surface storage tanks, monitoring of the reservoir of annulus fluid should be coupled with detection of significant losses (e.g., 25 gallons/day) from the system. If unaccountable makeup to the annulus fluid system exceeds more than about 25 gallons/day, then the injection well should be shut down to determine the cause of annulus fluid loss.

Monitoring of the injection formation is also best done by monitoring the injection well system. As noted above, EPA regulations require that the injection tubing pressure be continuously monitored while the system is in operation. Operation of the injection wells will result in injection pressures over a fairly narrow range for any specific well. If injection pressure increases significantly over the normal operating range, it could be a sign of formation plugging or of blockage immediately around the bore hole (e.g., precipitates formed around the hole which can be removed by acid stimulation). If such a pressure increase is experienced, the injection well is shut down to determine the cause and correct the situation. Sustained pressure increases, even after stimulation, may be a sign that the injection formation capacity is nearly exhausted and that the well will have to be properly plugged and closed.

Significant loss of injection pressure may be a sign that the formation has developed fractures or that a confining zone may have been breached. In either case, by immediately shutting the well down, further movement of the injected waste will be minimized until the cause of the pressure loss has been determined. If the pressure loss could not be attributed to specific problems within the injection well system, then a breach of the adjacent confining layer would be assumed. The injection well would then be shut down before the waste could migrate to any potential underground source of drinking water.

There are essentially four (4) general cases which describe the waste/geological structure combinations encountered in the underground injection of industrial wastes, and a fifth case which Du Pont believes presents a situation of special concern. The following descriptions elaborate on Du Pont's position that only in very specific and unique cases are monitoring wells necessary.

1. High-Density Fluid/Tight Confining Zones

When the waste being injected has a high density relative to the injection formation fluids, the injected waste will naturally migrate toward the lowest levels of the injection formation. The fact that the waste sinks to the bottom of the formation, combined with tight or consolidated confining zones provides adequate assurance that the waste or formation fluids will not migrate upward toward a potential USDW. If the formation becomes full, the injection pressure will increase because the formation fluids are restricted from upward movement by the confining zones. Such an increase in pressure would require a shutdown of the well to determine its cause. If it is confirmed that the formation is full, the well is shut down or a new shallower injection formation is selected.

2. High-Density Fluid/Suspect Fractures in Confining Zones

In this case, as in (1) above, if the wastes being injected have a high density relative to the formation fluids, the wastes will naturally migrate toward the bottom of the formation. Therefore, because the lighter formation fluids override the dense injection fluid, migration of wastes upward through possible fractures into a potential USDW is not a concern.

The major concern in this situation is that the lower density formation fluids, as they are displaced upwards when the formation fills, will migrate through the possible fractures in the confining zones. The extent and nature of the potential fractures would be discovered as a result of the initial geological/hydrological studies. The presence of the fractures should also be confirmed during the drilling of the bore hole. If a potential fractured confining zone system is suspected, the permit for the injection well will limit the allowed injection pressure to prevent such upward migration of the lighter formation fluid brines. Such pressure limits are easily calculated using standard engineering reservoir calculations. By limiting the injection pressures, when the point is reached where the formation is full and the potential for upward migration of formation fluids is real, the pressures will increase beyond the permitted limit and the well will be shut down. Once the injection ceases, the upward driving force on the formation fluids will be relieved and the fluids will remain in the formation and not migrate toward a potential USDW.

3. Low-Density Fluid/Tight Confining Zone

In this case, even though the lighter wastes will override the more dense formation fluids, the tight and consolidated confining zone will prevent any upward migration of the waste. If the confining zone were somehow breached., e.g., fractured, the injection pressure would drop suddenly requiring an immediate shutdown of the well until the cause of the pressure drop was determined. The potential for waste migration upwards into a potential USDW is very low.

4. Low-Density Fluid/Suspect Fractures in Confing Zones

In this case, installation of monitoring wells to help determine if waste is migrating upward may be appropriate. As in (3) above, the lighter wastes will override the formation fluids and therefore, as the formation fills up, will be pushed up against the confining zones. The concern is that waste will migrate upward along fracture patterns to the next highest aquifer. From the initial geological and hydrological studies, the potential for fractures would have been identified. If such fractures were very extensive, then the regulatory agencies would not allow injection because of the inadequate confining zones. If, however, the fractures were not so extensive as to eliminate possible injection, then the agencies would, and should, place limitations on injection pressures and, based on a case-by-case analysis, may require monitoring wells. Such monitoring wells should be located in the next highest aquifer above the confining zone, even if that aquifer is not a potential USDW. If this aquifer were not an USDW, monitoring it would provide an early warning for possible contamination and thus possibly prevent contamination of a potential USDW.

The monitoring wells should not be located in the confining zones because breaching of these zones should be minimized so as not to create avenues for migration. Because the lighter waste fluids will seek the path of least resistance, and will therefore tend to migrate upgradient, the monitor wells should actually be located upgradient of the disposal well, not downgradient.

If contamination is discovered in the monitoring wells, then the injection well would be required to shut down or seek a new injection zone which contains sufficient confining zones. Once the injection well has ceased operation, the upward migration will cease because the pressure on the formation which was driving the waste upward would have been relieved.

5. Injection in Close Proximity to USDW

Du Pont believes that monitoring wells may be appropriate in those situations where waste injection occurs in relative close proximity to the lowermost USDW. Specifically, if wastes are injected into disposal formations which are within 300 feet of the lowermost USDW, monitoring wells may be an appropriate requirement.

In summary, there are only a few instances where a specific monitoring well should be considered technically appropriate. Such an occasion exists if the injection fluid is a low-density fluid where fractures are suspected in the confining zones, or in those situations where the disposal formation is within close proximity of the lowermost USDW. In such cases, the monitoring well will help determine if the injection fluid or even lighter formation fluids are migrating upward toward a potentially usable USDW. Du Pont believes that in these circumstances the monitoring well should be located in the aquifer immediately above the confining zones, even if this aquifer is not a potentially usable USDW. Such location of the monitoring well will provide an early warning of potential migration toward usable aquifers. The actual requirement for a monitoring well, however, depends on many site-specific variables and should be left to the discretion of the appropriate regulatory agency. Monitoring wells should not be a blanket requirement for all Class I underground injection well systems because such a requirement would not be technically or economically justified.

EPA Position on Monitoring Wells

EPA Assistant Administrator for Water, Jack Ravan, testified on June 11, 1984 before this Subcommittee regarding the proposed blanket requirement for monitoring wells downgradient of all Class I injection wells. The Agency correctly opposed such a blanket requirement as unnecessary for proper operation and control of underground injection wells. Ravan also pointed out that EPA already has adequate authority to require monitoring wells when necessary, and uses such authority during the consideration of individual injection well permits.

In the Agency's most recent regulatory action impacting underground injection wells (40 Fed. Reg. 20138, et seq., May 11, 1984 - Final Rule for EPA-Administered Programs in 22 Jurisdictions), EPA discusses its existing authority to require monitoring wells, as well as the necessity for such monitoring wells. EPA stated that it agrees "that in some cases the installation of monitoring wells is either unsound or ineffective." (p. 20150/1) EPA goes on to conclude:

> "With respect to detection of leaks in the well casing, monitoring of injection pressure will detect leaks much more readily than will monitoring wells. With respect to the unlikely prospect that the confining layer above the injection formation has been breached, monitoring wells in the surface aquifer are even less effective, due to the extremely long time it would take for injected fluids from deep Class I wells to migrate upward to the surface aquifer. Placement of monitoring wells in deeper USDWs is unsound in many cases, because the act of drilling the monitoring wells will create a route through the confining layers of these deeper formations, possibly increasing the likelihood that fluids could migrate into the more critical shallow formations."
> (p. 20150/1, 2)

EPA's intent in promulgating certain of these regulations is to provide authority to the appropriate regulatory agency to require monitoring wells when it is deemed necessary. The Agency further states that it believes "that in certain specific cases properly installed monitoring wells may be desirable to have around Class I wells." (p. 20150/2) EPA's efforts regarding the necessity of monitoring wells, according to its recent final regulations, will require a positive action on the part of the regulatory agency. Such requirements, involving detailed and site-specific conditions, are appropriate for permitting actions according to EPA. In summary, the Agency believes that monitoring wells are not appropriate in many instances, but it has reserved the authority to require such wells in those instances it deems appropriate. Du Pont supports this Agency position based on a site-specific, case-by-case anaylsis to determine if the installation of monitoring wells would be technically sound, effective, and economically reasonable.

EN-1028 REV 5-82

DU PONT
ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

ENGINEERING DEPARTMENT
~~LOUVIERS BUILDING~~

July 26, 1984

AIRBORNE

Ms. Heather Wicke
Committee on Environment and Public Works
Toxic Substances and Environmental Oversight Subcommittee
Senate Office Building, Room 408
Washington, D.C. 20510

Dear Ms. Wicke:

DU PONT RESPONSES TO SENATOR DURENBERGER'S QUESTIONS

Pursuant to Senator Durenberger's letter of July 17, 1984, attached are E. I. du Pont de Nemours and Company's (Du Pont's) responses to the Senator's questions regarding underground injection operations. Attachment I provides Du Pont's answers to those questions directed specifically to me.

We have also taken this opportunity to offer Du Pont's response to a number of questions the Senator posed during the June 26, 1984 hearing before the Toxic Substances and Environmental Oversight Subcommittee, as well as a few of those follow-up questions directed to other witnesses. (Attachment II).

If you have any questions regarding Du Pont's answers, please contact me through Mr. David Modi of our Washington Office. Thank you for this opportunity to respond to your questions.

Sincerely,

Charles R. Sherman

Charles R. Sherman

CRS:caw
Attachments

ATTACHMENT I

1. On p. 14 of your written testimony, you stated that a significant loss of pressure may be a sign that the formation has developed fractures or that a confining zone may have been breached.

   (a) In the case of either of these occurrences, would a significant loss of injection pressure definitely be registered?

   (b) Would it depend on how far away from the well bore the fracturing occurred?

Du Pont Response

(a) Yes.

Class I injection wells are not permitted to operate at pressures which would fracture the injection zone or confining zones(s) [Underground Injection Control (UIC) regulations - 40 CFR 146.13(a)(1)]. During the permitting processs, the applicant must demonstrate what pressures are required to fracture the injection zone and confining zone(s) preliminary to the control agency setting permit limits on injection rates and pressures.

Rock fracture occurs instantaneously in response to high energy input. This energy input is always higher than permit levels. When a rock is fractured there is an instantaneous pressure drop because the energy input necessary to create the fracture is dissipated into the rock. To keep a fracture open a high level of energy must be maintained otherwise the rock will close and seal itself. The pressure buildup prior to fracturing along with the accompanying instantaneous pressure drop at initiation of fracture would be noticed on the continuous pressure recorders required by the monitoring provisions of the UIC regulations. Because this would be an operating phenomenon outside of normal permit conditions, the responsible control agency would have to be notified and an investigation conducted to explain the observed pressure changes. If fracturing is confirmed, new restrictive permit limits would be placed upon the operation to prevent the recurrence of fracturing or the well could be shut down.

(b) Rock fracture from an injection operation could only occur within the immediate vicinity of a well bore because the energy required for fracturing dissipates rapidly away from the well. Fracturing at distances from the well is not possible with current injection equipment. The typical injection pumps for Class I wells do not have sufficient pressure ratings to fracture confining zones beyond the immediate vicinity of the well bore. Because of the rigorous geological investigations required prior to and during the UIC permit process, it is unreasonable to assume that unknown fractures in the confining zone would exist within the zone of influence of a Class I injection well. Unknown natural fractures at the outer limits of the study zone would be beyond the pressure influence of an injection well and would not act as conduits for upward migration of wastes.

ATTACHMENT I (Cont'd.)

2. The UIC program administrator from Florida, Ms. Leslie Bell, suggested two changes that would improve the existing program; (1) specific requirements for a confining zone(s) above the Class I injection zone, and (2) a requirement for an approved back-up disposal method prior to issuance of a construction permit for a Class I well.

   What is your view of the need for such changes and the form that they should take?

Du Pont Response

2. (1) The UIC regulations have implicit and implied provisions for recognizing the need for and presence of confining zones. (40 CFR 146.03, 146.12, 146.13, and 146.14). Most states and EPA require that a minimum of one confining zone be present.

   (2) The UIC regulations require an applicant to have a contingency plan to deal with a well failure (40 CFR 146.14). An applicant is not required to have in place a back-up means for disposal prior to or during well construction or operation; nor should there be such a provision. It should be incumbant upon a well operator to insure the continuous processing of waste fluids if a well should fail, otherwise the manufacturing operation would have to be shut down. Most prudent manufacturers will have back-up facilities designated or installed without the pressure of a regulation. The UIC regulations are sufficiently comprehensive yet generic to permit the flexibility necessary for implementing a nationwide UIC program where the geology and injection conditions are so variable. Each state has the authority to adopt those specific limitations or provisions in addition to the Federal UIC provisions, which more effectively address local conditions.

ATTACHMENT II

Follow-Up Questions

1. Question #3 for Bill Klemt -

   No monitoring outside the well means we are relying on the absolute stability of the subsurface geology and the mechanical and operational integrity of the well.

   - Has the State instituted special measures for ensuring quality control in the design, construction and installation of wells and operational requirements?

Du Pont Response

The UIC regulations, 40 CFR 146, Subpart B, contain provisions regarding quality control requirements. These requirements are specific to construction, operating, monitoring and reporting provisions for Class I injection wells. Those states which have assumed primacy of the UIC program are required to enforce these standards. For those states in which EPA manages the UIC program, EPA then enforces these quality control requirements.

ATTACHMENT II (Cont'd.)

2. Question #5 for Bill Klemt -

At the first hearing on Safe Drinking Water Act amendments, we heard the public water supply representatives express the view that well operators be required to notify public water systems of the location of any wells that might affect their water supply in the event of a leak.

- Is the information made available to water suppliers in your states?
- Could such a requirement be effectively incorporated into a state program--say as another condition of a permit?

Du Pont Response

The UIC regulations and permitting guidelines issued by EPA require that all landowners and affected parties within the "area of review" of an injection well must be notified specifically regarding the operators permit application. Therefore, all potentially impacted parties, including water supply representatives, have the opportunity to become involved in the permit review process. During such a review process, the control agencies would therefore be aware of the potentially impacted parties. If a problem with an injection well develops for which the control agency must be notified, then the control agency would be aware of the impacted water suppliers and contact them if it were deemed appropriate. Therefore, the UIC regulatory process addresses the concern of the water supply representatives regarding notification of potential problems associated with an injection well which may affect water suppliers.

3. Question #2 for Suellen Pirages -

I absolutely agree with your encouragement on p. 6 of your testimony to focus efforts on well design and installation in a preventive mode. If, however, we cannot assure that we can prevent any leak from occurring now, doesn't that make a case for having a warning system so that an individual drinking contaminated water would know as soon as possible?

Du Pont Response

If a control agency follows the requirements of the UIC regulations regarding geological study requirements, location criteria, design, operation, monitoring, and mechanical integrity testing requirements, then the possibility of a leak contaminating a potential drinking water source is very remote. Because of the safeguards mandated by the UIC regulations, if a leak does occur it will be immediately detected, the control agency will be notified and the leak will be repaired before additional injection is allowed. Thus, the regulations ensure that the leak occurrence and the response to it are managed properly, preventing potential adverse impacts due to the leak. The UIC regulations are, therefore, sufficiently comprehensive that no leak should go undetected for a long period of time and potentially endanger an underground source of drinking water.

Questions at Sub-Committee Hearing

1. What is the normal process to verify the accuracy of pretreatment?

Du Pont Response

An applicant for a Class I injection well declares the specific waste characteristics of the proposed fluid for injection. Those characteristics then become part of the permit and must be maintained and confirmed by monitoring. The well materials of construction must be specified for use with the declared waste. The adequacy of these materials is demonstrated by exposure tests in labs prior to installation. During the mechanical integrity testing their adequacy is confirmed periodically. Where pretreatment facilities are used, the appropriate control agency has the authority to review those facilities as part of the UIC permitting process.

2. Can there be leaks outside of the well that can occur that would not be detected by within well monitoring?

Du Pont Response

By following UIC regulations and guidelines the control agencies will know of significant discontinuities in the confining zone which might permit waste migration. Knowing of these discontinuities, a control agency would either not issue a permit, or would place limitations (e.g., injection rate and pressure) upon a permit so that migration out of the injection zone would not occur. When a well is completed, and prior to injection, it must pass a mechanical integrity test. At intervals during operation, a well must be retested and pass the mechanical integrity tests. As long as a well which has been properly tested operates within permitted limits and doesn't exhibit unusual pressure fluctuations, the possibility of an undetected leak occurring is marginal.

3. There is some evidence that in some cases of contamination from injection, that unplugged oil and gas wells have provided a pathway for migration. The hazard posed by unplugged wells in areas of waste injection is particularly threatening because the location of many of the wells is unknown. There are estimates of as many as one million unplugged, unlocated wells. Do you have any estimate of the nature of that problem in this country? Has Texas found some way to avoid the problem?

Du Pont Response

In most areas of the country where Class I wells are constructed the locations of old oil and gas wells are known. For wells within the designated "area of review" plugging records are usually available. If they are not available or indicate inadequate plugging, the wells can be re-entered and properly plugged.

Most wells drilled after the early 1900s were recorded and records maintained. For wells drilled prior to the early 1900s, it is known that the equipment to drill wells limited their depth to a maximum of 3000' -- usually 1000'-1500'. By knowing what was common practice in an area at the time it can be determined what depth wells were drilled. By drilling injection wells deeper, it can be safely assumed that an unknown well will not be present that could cause a problem.

STATEMENT OF
THE AMERICAN GAS ASSOCIATION
BEFORE THE
SUBCOMMITTEE ON TOXIC SUBSTANCES AND ENVIRONMENTAL OVERSIGHT
UNITED STATES SENATE
ON
SAFE DRINKING WATER ACT REAUTHORIZATION

JUNE 11, 1984

The American Gas Association (A.G.A.) is composed of nearly 300 natural gas distribution and transmission companies which make nearly 85% of the nation's natural gas utility sales. Underground storage of natural gas plays a vital part in enabling our member companies to meet the demands of their customers. A.G.A. therefore appreciates the opportunity to express our members' views on continuing the exclusion of natural gas underground storage operations from the Safe Drinking Water Act (SDWA).

A.G.A. strongly supports efforts to protect precious underground drinking water sources from contamination. The Safe Drinking Water Act, as presently constituted, pursues this objective by directing the Environmental Protection Agency (EPA) to develop minimum requirements for programs to be carried out by the States.

These EPA requirements mandate State action to prevent underground injection that endangers drinking water sources. A.G.A.'s view on this point is that underground natural gas storage does not endanger drinking water sources. Thus, the exemption of underground natural gas storage from the statutory definition of underground injection is appropriate and should be continued.

In the 1980 debates which surrounded the Safe Drinking Water Act Amendments, it was well-established that natural gas in drinking water does not adversely affect public health in any way. In fact, natural gas storage operations do not even affect underground drinking water sources -- let alone endanger them.

Natural gas, *i.e.* methane, is only slightly soluble in water. The minute quantities of methane in water at formation pressure would tend to come out of solution once the water reaches the surface and the pressure is released. Furthermore, methane exists naturally in underground drinking water sources that are used as municipal, household and livestock water supplies; such water supplies have been used for years without harmful effects. [1]

Before the exclusion for underground storage of natural gas was granted by Congress in 1980, EPA included natural gas storage wells in Class V. EPA did so because it believed that gas storage could displace other contaminating fluid into drinking water sources -- even though EPA did not contend that natural gas itself contaminated or threatened drinking water. This possibility, however, is extremely remote. When stored, natural gas is pumped under pressure from the surface down a cased borehole into a large volume of porous rock, called the reservoir rock. The reservoir rock is usually surrounded by strata with relatively low porosity and permeability, called cap rock. The enclosing cap rock prevents the gas from escaping from the reservoir. Unless there is a faulting (or an old borehold) in the cap rock, the gas and any formation fluid will remain in the reservoir. A storage reservoir with a crack or fault -- or even an old borehole that permits formation fluids to migrate -- would be useless for storage purposes, because it would also permit natural gas to migrate. For existing storage reservoirs, operators can rely on their monitoring records to show that the reservoir is tight. As for new storage reservoirs, operators will use state of the art pressure and testing techniques before starting storage operations. This will ensure that neither natural gas nor formation fluids can escape.

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[1] The extremely low solubility of natural gas limits the amount of methane that a person can conceivably ingest from drinking water. Some people actually produce methane in their bodies. Such a person can exhale over 5.5 times more methane than that person could ingest from drinking water, even assuming he drank 56 oz. of methane-saturated water every day. "Impact of Natural Gas on Drinking Water Quality and Human Health", Midwest Research Institute, at p. 49 (June 30, 1978).

The leakage of gas that has already been paid for provides ample incentive for the operator to seek the tightest storage possible. The threat of economic loss when gas escapes from storage will force operators to install state-of-the-art monitoring and pressure testing technology to disclose natural gas losses. The operator will take immediate action to stop any leaks detected. Therefore, A.G.A. believes that the possibility of displacing formation fluids into our nation's drinking water is very remote with modern monitoring and testing practices. The economic incentive to prevent reservoir leaks makes superfluous the possible inclusion of natural gas storage wells in the SDWA.

Conclusion

In summary, the basic facts of methane/water chemistry make it difficult for any significant concentrations of methane to remain in solution with drinking water; the basic facts of human chemistry make methane-saturated water harmless even if it did occur; and the economic incentives for preventing any significant leakage of underground storage gas render extremely remote any possibility that natural gas itself -- or displaced contaminating fluids -- could seep into drinking water supplies from underground storage reservoirs.

For the above reasons, A.G.A. urges continuation of the exclusion of natural gas storage from the definition of underground injection found in current law. In 1980, Congress determined that underground natural gas storage activities posed no threat to the nation's drinking water, and nothing has occurred since then which would require Congress to change this wise decision.

A.G.A. appreciates the opportunity to present our views on this important issue.

CMA
CHEMICAL MANUFACTURERS ASSOCIATION

WRITTEN STATEMENT

OF THE

CHEMICAL MANUFACTURERS ASSOCIATION

FOR THE

SUBCOMMITTEE ON TOXIC SUBSTANCES

AND ENVIRONMENTAL OVERSIGHT

OF THE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ON

SAFE DRINKING WATER ACT AMENDMENTS

JULY 13, 1984

2501 M Street, NW • Washington, DC 20037 • Telephone 202/887-1100 • Telex 89617 (CMA WSH)

The Chemical Manufacturers Association (CMA) appreciates the opportunity to present its views on S. 2649, the Safe Drinking Water Act Amendments of 1984. CMA is a nonprofit trade association whose company members represent more than 90% of the productive capacity of basic industrial chemicals in this country.

Assuring a safe and adequate supply of drinking water is, and should be, one of the highest national priorities. CMA strongly supports the objective of the Safe Drinking Water Act (SDWA) -- to assure that water supply systems serving the public meet minimum national standards for protecting public health. Although significant progress has been made, more needs to be done. In this regard, we believe S. 2649 is a balanced and realistic proposal for reauthorization of the SDWA. We generally support this legislation, and we hope that it can be acted upon expeditiously.

The bill contains a number of provisions that would significantly improve the effectiveness of the SDWA. It streamlines the standard setting process regarding establishment of maximum contaminant level goals and national primary drinking water regulations. It also establishes an accelerated schedule for standard setting. At the same time, the bill assures that the Science Advisory Board has the opportunity to consider the health and science issues related to these standards. The bill also includes an important provision that severely punishes anyone who intentionally tampers or threatens to tamper with a public water system.

We do have some suggestions on provisions dealing with enforcement authority and appropriate goals and policy for the Act. In addition, we are very concerned with language which proposes that costs no longer be considered in setting drinking water standards. Our following comments will discuss these issues in more detail.

Standard Setting

CMA supports the expedited standard setting approach contained in S. 2649. The bill presents a tough, yet realistic schedule for EPA to promulgate additional needed drinking water standards. We believe that a federal standard, with the opportunity for public comment and EPA Science Advisory Board review, is the appropriate way to establish an enforceable number which may be used with certainty nationwide. States frequently do not have the resources to conduct the detailed research and investigations on health effects that are necessary to develop sound standards, yet feel pressured to set their own standards in the absence of EPA's.

CMA also supports the provision that provides an opportunity for the EPA Science Advisory Board to comment prior to proposal of maximum contaminant level goals and national primary drinking water regulations. The Science Advisory Board should have every opportunity to provide input to the standard-setting process. Their review should not delay the proposal and/or promulgation of standards, however.

Although we support the approach contained in the bill, including the simultaneous promulgation of maximum contaminant level goals and national primary drinking water regulations, we are concerned that it makes a significant shift in policy by no longer considering costs in setting standards. CMA believes that costs are a relevant factor and must be considered in establishing drinking water standards. CMA therefore recommends that any statutory definition of "feasible" continue to include the phrase "taking cost into consideration."

ENFORCEMENT

Section 4 would amend Section 1414(a)(2) of the SDWA to require that EPA issue an Administrative Order or commence a civil action whenever a public water system is not in compliance with a SDWA regulation or requirement. Section 13 contains a similar mandatory order or civil action requirement with regard to enforcement of underground injection standards.

CMA does not believe that EPA's enforcement discretion should be so curtailed as to require issuance of an

Administrative Order or institution of a civil action for every violation of a regulatory standard. There may be instances, for example, of technical or minor violations which the state did not believe warranted requiring such drastic measures. These violations may be easily corrected through negotiations between the state and/or EPA and the public water system. To require EPA to issue Administrative Orders or to institute civil actions could prove to be a significant drain on the Agency's limited manpower and budgetary resources, and in many cases these efforts may be directed at "technical" violations rather than at serious problems.

CMA recommends that both Section 4 and Section 13 be revised to allow EPA the discretion to issue an Administrative Order or bring a civil action if such measures are deemed appropriate.

CMA also recommends that proposed Sections 1414(g)(1) and 1423(d)(1) be clarified to indicate that an Administrative Order would be issued in lieu of a civil action rather than in addition to such action. The current language which states that the "Administrator also may issue an order..." is confusing and appears to authorize an order only if a civil action has already been instituted. Such duplicative enforcement provisions are unnecessary and an Administrative Order should be allowed in lieu of a civil action to provide EPA with the greatest flexibility.

CMA also believes that proposed Sections 1414(g)(2) and 1423(d)(2) should be clarified to clearly stipulate that an Administrative Order would not take effect until after the opportunity for a hearing on the matter.

CMA further submits that the requirement of proposed Sections 1414(g)(2) and 1423(d)(2), whereby a copy of an Administrative Order must be issued to appropriate corporate officers, is unnecessary and redundant. All corporations have registered agents designated for the receipt of various official documents. The registered agents provide a valuable and efficient service and should be the designated recipients of EPA's Administrative Orders. CMA, therefore, recommends deletion of the last sentence in Sections 1414(g)(2) and 1423(d)(2).

In addition, CMA strongly opposes proposed Sections 1414(g)(3)(B) and 1423 (d)(3)(B), whereby EPA could assess Administrative civil penalties in amounts up to $5,000. CMA believes that monetary fines should only be levied after full due process has been completed and proposed fines have been judicially reviewed for their potential abuse of discretion, capriciousness, or arbitrariness. CMA therefore strongly recommends deletion of the language granting EPA authority to issue Administrative civil penalties.

Declaration of Goals and Policy

CMA believes it would be inappropriate to redirect the historical scope and objective of the Safe Drinking Water Act away from that of assuring all public water systems provide a safe supply of drinking water to the people of this Nation to that of far broader objectives of groundwater protection. CMA agrees that groundwater resources must be adequately protected, but we do not believe that the SDWA is the appropriate statute to achieve this result.

The current SDWA, along with many of the changes proposed in S. 2649, provides EPA with the necessary authority to protect drinking water supplies, including that derived from groundwater. CMA believes this statutory focus is separate and distinct from protecting the surface waters and groundwater resources of this Nation, which are covered by other federal and state statutes. CMA also disagrees with the notion that all groundwater must be protected, in perpetuity, to drinking water standard levels. Such an approach ignores essential practical realities and the experience of the states in managing their groundwater resources. Not all groundwater is, or ever will be, used for drinking water purposes. Moreover, aquifers may be naturally contaminated to levels above drinking water standards. Further, quantity limitations may preclude the use of many aquifers for public drinking water; technical and economic considerations may preclude the use of deep groundwater aquifers because overly abundant surface supplies and shallow groundwater aquifers are available; and uses of groundwater, e.g., irrigation, industrial processes, mining, etc., may require different levels of protection.

CMA agrees that groundwater resources must be adequately protected. We believe that the degree of protection must be reasonably related to the actual or intended future use of the groundwater. CMA supports such a general groundwater protection program and we believe that EPA's "Groundwater Protection Strategy", due to be finalized shortly, is a reasonable beginning. EPA has recognized the importance of groundwater, as reflected by the Agency's recent establishment of a new Office of Groundwater Protection. CMA submits that this office should be given the opportunity to coordinate all of the Agency's groundwater protection efforts and develop an approach it believes is best suited to accomplish such groundwater protection objectives. Designating the SDWA or any other statutory mechanism as the appropriate groundwater protection vehicle is premature in CMA's view, and may, in fact, impede efforts by all interested parties to determine the best approach for protecting our groundwater resources.

Therefore, we recommend that the Subcommittee delete the phrase "and to protect the groundwater resources of this Nation from contamination" from Section 1400(a) and Section 1400(a)(3) in its entirety. CMA does not oppose such an objective; however, we do not believe the SDWA is the appropriate statute to address this situation.

No New Federal Cause of Action

Some have suggested that a new federal cause of action allowing municipal water systems and private well owners to sue under federal law for groundwater contamination should be created in legislation reauthorizing the SDWA. CMA strongly believes this is unnecessary and inappropriate. Such a provision would seriously interfere with state remedies for groundwater pollution, state water rights and state groundwater management programs. We commend you for not including this inappropriate provision in the bill.

Numerous state common law and statutory remedies already exist to protect the rights of groundwater users. The wide variety of state remedies reflects a balancing of the unique legal, hydrological, social and economic conditions in each state. A new federal cause of action would displace these state remedies and would disrupt the balancing of differing water uses and land uses.

Such a federal cause of action would seriously interfere with state water allocation systems and with the exercise of state water rights. Lawful water use, including the lawful diversion and consumptive use of water, would be affected.

This is because beneficial water use and groundwater quality are intimately related. Withdrawal of water from an aquifer may lead to salt water intrusion or induce recharge of the aquifer by contaminated surface streams. In addition, withdrawal may reduce the volume of water remaining to dilute pollutants in the aquifer. State groundwater programs are designed to balance the rights of surface and groundwater users while ensuring the maintenance of adequate groundwater quality. A federal cause of action would disrupt these carefully balanced state programs and interfere with lawful consumptive use of water under state water rights.

At our request, the law firm of Kirkland and Ellis has conducted an analysis of the impact of a federal cause of action which explores these issues in more detail. We ask that this analysis be included in the record.

Underground Source of Drinking Water Definition

CMA also commends the decision to not include a new definition of underground source of drinking water in S. 2649. Section 1421 (d)(2) of the SDWA already contains a broad definition of this term in developing controls on underground injection, basically defining it as underground water which supplies or can reasonably be expected to supply any public water system. We believe this is a strong and workable definition that looks not only to existing sources of drinking water but also to future uses of groundwater as drinking water sources. We do not see a need to create a new statutory definition of an underground source of drinking water.

Conclusion

CMA is pleased to have had the opportunity to submit these comments. We appreciate the willingness of the Subcommittee and its staff to work with all interested parties in developing this legislation. The decision to communicate with every group has established a positive tone and direction that will help in promoting passage of SDWA amendments in the current Congress. CMA hopes that this constructive process will again be utilized with respect to other legislative issues before this Subcommittee.

Statement for the Record
by American Cyanamid Company
for
Senate Committee on Environmental Public Works

American Cyanamid Company is submitting herein for the record comments on Amendments to the Safe Drinking Water Act (SDWA) Senate Bill S.2649.

American Cyanamid Company is a diversified, multi-national corporation engaged in five major businesses: specialty chemicals, agricultural products, consumer products, medical products, and FORMICA® brand products. American Cyanamid produces and sells more than 2,500 products in more than 100 countries worldwide.

American Cyanamid has considerable interest in reviewing legislative developments to ensure any legislation and subsequent regulations effectively address the defined problem areas. We firmly believe legislation must effectively balance the cost of regulation and the resulting benefits to society.

American Cyanamid operates disposal wells at three domestic production facilities, employing approximately 1500 persons, for the disposal of both hazardous and non-hazardous industrial wastes. With this perspective, we are submitting comments herein for the Record on Senate Bill S.2649 relative to deepwell disposal:

1. Section 1426, "Restrictions on Hazardous Waste Injection," would place a ban on hazardous waste injection "...above or into a formation which contains (within one quarter mile of the injection well bore) a drinking water source." American Cyanamid supports this concept to adequately protect human health and the environment. Additionally, however, we suggest broadening this to include the disposal of radioactive wastes above or into...." We believe this objective can and will be achieved by the EPA placing a ban on Class IV wells.

2. Section 1427 deals with "Regulation of State Programs." Although we generally agree with the concepts of this proposed section, our comments are restricted to the specific wording and requirements.

   Proposed Section 1427(a)(1) pertains to restoration of groundwater quality after the termination of Class III operations. We believe the intent was restoration of groundwater quality "...will not exceed national primary drinking water...". The word "not" appears to have been omitted.

   Proposed Section 1427(a)(2) would require monitoring of underground drinking water sources downgradient from Class I injection wells. We support the need for monitoring drinking water sources having the potential to become contaminated by well failure, but we believe some clarification and additional requirements should be included, as follows:

(a) The requirement for monitoring should not be limited only to Class I injection wells. It should be imposed on all injection wells including Classes II and III.

(b) The requirement should be more specific with regard to the number, location and depth of monitoring wells and the parameters to be measured. A number of geologic setting have multiple confining layers between a source of drinking water and the injection zone. In these cases the only zone of concern would be the lowermost source of drinking water. Monitoring of the zone immediately above the confining zone may be technically infeasible and can be very costly, depending on site specific geologic conditions.

Inasmuch as pressure falls off with the square of radial distance from the injection well, it is suggested to monitor in relatively close radial proximity to the injection well, the area most likely to experience the effect of a cement or casing failure or fracture of confining strata, should they occur. This close placement of the monitoring wells would enable them to act as an early warning system and thus, minimize the risk of off-site migration of contaminants in the event of a failure.

Monitoring parameters should be selected such as to be related to the constituent(s) of the waste being injected. Broad, generalized, unrelated parameter analysis should not be imposed.

Proposed Section 1427(c) would require EPA to submit to Congress an inventory of all hazardous waste wells within three months. We do not support the need for this requirement in its present form because:

(a) if it is to be based solely on the "20 plant study" it is unnecessary since this data has already been compiled by the EPA and needs only to be released, and

(b) the three month requirement is unrealistic if the inventory is to go beyond the "20 plant study"; one year would be more realistic.

In addition, the inconsistency of some of the data requested with respect to the existing UIC program requirements may result in some data not being readily obtainable. For example:

(1) the hydrogeologic characteristics of the underlying strata are generally not studied,

(2) individual drinking water aquifers penetrated by each well are not studied in detail, rather the depth to 10,000 mg/l TDS is the prime concern, and

(3) drinking water wells studied are generally only within a 2 mile rather than a 5 mile radius of the injection well.

(c) The Well inventory requirement of Section 1427(c))6) specifying the need for only one year of waste characterization and volume data may not provide sufficient data due to the influence on manufacturing volumes. We believe a minimum of three years of data would be required to properly characterize a specific injection well.

(3) Proposed Section 1427(c) subsections are improperly designated. After subsection (c) there are subsections (1) through (9) followed by subsections (b) and (c). The current references and subsection numbers should be corrected.

American Cyanamid is pleased to have the opportunity to submit the foregoing statement for the Record concerning Senate Bill S. 2649. We will be glad to answer any questions the Senate Committee on Environmental Public Works may have concerning this most important issue to our industry.

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